TECHNOLOGY DEPT.

A National Newspaper for Every Branch of the Industry

Automotive Daily News

CARS · SHOP EQUIPMENT · TRUCKS · AVIATION · PARTS · ACCESSORIES · TIRES

Vol. 11. No. 1409. Entered as second-class matter Aug. 27, 1925, Post Office, N. Y., N. Y., Under Act of March 3, 1879. NEW YORK, FRIDAY, FEBRUARY 20, 1931 5 Cents. $12 Per Year.

AUTOMOTIVE LIBRARY FEB 23 1931 DETROIT

NEW TRUCK SALES GAIN IN JANUARY

Financing of Retail Car Sales in 1930 Tops 1928; Wholesale Close to 1929

Average Price of New Cars in 1930 Was $571, as Compared With $595 in 1929; Used Car Prices Also Reduced During 1930

WASHINGTON, Feb. 19.—Retail financing of new and used cars totaled 2,995,622 units in 1930, on which $1,299,965,225 was advanced, as compared with 3,559,829 cars on which $1,622,768,300 was paid out in the previous year.

Wholesale financing last year amounted to $661,525,041 as compared with $677,891,246 in 1929.

Although 1928 was considered a normal year in the automotive in-

(Continued on Page 2)

STEEL OPERATIONS UP; LARGER PURCHASES BY MOTORS AHEAD

Youngstown, O., Feb. 19.—Since steel sheet manufacturing companies in the Mahoning Valley have regulated their schedules to fluctuating demands from leading automobile manufacturers, it appears that operations in such plants in this district have advanced somewhat this week. Reports that automobile factory schedules are being increased by various interests are brighter than for several weeks.

Sheet production in this district at the end of the week was approximately at 45 per cent. of capacity with staggered schedules making an estimate of the full week's operations difficult. Several sheet plants which had been idle resumed operations this week on a bulge in business and developments indicate a steady although slow improvement in the automobile industry may result in higher operations at other plants.

The industrial average in this area at midweek was at 50 per cent. of capacity, unchanged from a week ago. Apparently a slight increase in this rate will be made next week, enabling the average to rise above 50 per cent. for the first time this year. Operations in this week a

(Continued on Page 12)

FORD SEES BUSINESS RECOVERY UNDER WAY

Carlisle, Pa., Feb. 19.—Henry Ford, in the course of a visit here today, declared "the business situation is improving, but we cannot look for a rapid recovery to the standards of the first half of 1929."

"The deflation has been good for business and the change from the artificial standards of the past few years to a more normal readjustment has been a valuable experience for the American people," Mr. Ford continued. "The greatest thing it has done is to cause people to stop and think and whenever people do that, they usually bring themselves out of trouble and advance to a higher and better plane of living.

"The financial and business structure of the country is normal and is proceeding in a natural and reasonable way toward recovery. Employment is reported as increasing and in general the prospects are better than they were two months ago."

23 STATES AND D. C. REPORT 9% UPTURN OVER DECEMBER

Estimates Based on These Returns Indicate Total of More Than 20,000; Rate of Decline From Year Ago Cut

NEW YORK, Feb. 19.—Retail sales of new commercial cars in January showed some recovery from the low level prevailing at the close of last year, according to the registration returns from the first twenty-three states to report for last month and the District of Columbia.

Registrations of new trucks in these states and the District of Columbia in January amounted to 10.152, as against 9,276 for the same states in December, a gain of 9 per cent., and comparing with 13,324 in January, 1930, a decline of 23 per cent.

This rate of falling off from the corresponding month of last year was somewhat higher than in December, but represents a substantial improvement over November and October. In December, under the impetus of new models, particularly the Chevrolet, sales declined only 19 per cent. from the level of the corresponding month of 1929. In November and October, however, the declines were 34 and 32 per cent., respectively, from the corresponding periods of the preceding year.

On the basis of the returns from the states reporting thus far, it is estimated that registrations of new commercial cars in January approximated 20,250, as compared with 18,654 in December, 1930, and 30,274 in January, 1930.

(Continued on Page 2)

GENERAL MOTOR BUYS AUSTRALIAN BODY PLANT

Sydney, N. S. W., Feb. 19.—General Motors of Australia, it was announced today, has acquired Holden's Automobile Body Company, a $5,500,000 concern.

WINONA, MINN., DEALERS CLAIM SOLUTION OF USED CAR MERCHANDISING PROBLEM

By F. E. EDWARDS

WINONA, Minn., Feb. 19.—Seven of the ten automobile dealers in this town of fewer then 20,000 inhabitants believe that they have solved the used car problem. In support of their belief they cite the fact that not one of them has a used car in stock and that every new car sale is a clean deal.

The so-called "Winona plan" has been in operation for more than a year. The seven dealers who support it have maintained their new car business at a level above most of the rest of the country, in spite of prophecies to the contrary by dealers in other places. It is scarcely necessary to say that the dealers supporting the Winona plan are still completely sold on the idea.

To a man these dealers claim that the value of the plan lies in its elimination of used car worries, permitting them to devote one hundred per cent. of their time to selling new cars.

In actual operation this has been

(Continued on Page 2)

OKLAHOMA MEASURE ENDANGERS EQUITY OF DEALER IN CAR

Chicago, Feb. 19.—The National Association of Finance Companies today sent to all finance companies, automobile manufacturers and the various automotive associations a descripton of a measure which has been introduced in the Oklahoma Senate. This bill is intended to give

(Continued on Page 11)

FINANCE ASSOCIATION FAVORS CONN. BILL ON CHATTEL MORTGAGES

Chicago, Feb. 19.—The National Association of Finance Companies discussing the modernizing of the Connecticut chattel mortgage law, says:

"Connecticut Senate bill No. 314 is a bill to validate chattel mort-

(Continued on Page 11)

FORD'S MILWAUKEE PLANT INCREASES PRODUCTION

Milwaukee Wis., Feb. 19.—Effective February 16, the Ford assembly plant here increased its production by 300 units, according to L. T. Henderson, general manager. This will bring the February total up to 1,200 units and means a mid-month increase in the original February schedule.

Portland Show Aids Trade; Staging Used Car Exhibit

PORTLAND, Ore., Feb. 19.—Portland's 1931 automobile show which was held last week was better from a sales standpoint than last year's show, according to James Cassell, manager, who was taking into consideration cars sold and the likely prospects which the dealers have found at the show.

Responses from the dealers, which are not yet complete, indicate that most firms have sold several automobiles, and most of them reported that sales prospects were better than last year. Two or three of the dealers reported that interest and purchases were about the same as a year ago. Attendance figures were approximately the same both years.

Low prices quoted on 1931 models proved an incentive toward purchases, dealers said. New mechanical features received careful attention. Most of the purchasers and prospects were present owners who had delayed a year or so in replacing a two or three year old car.

Free wheeling and other mechanical improvements received full share of attention from show visitors and the demonstrators were kept busy explaining the devices in detail.

One of the largest meetings on record was held during the week by the Oregon section of the Society of Automotive Engineers. A banquet at the Multnomah Hotel was followed by several addresses, including those by R. E. Riley, executive secretary civic emergency committee; Prof. F. G. Baender, Oregon State College, and Frank H.

(Continued on Page 2)

TODAY

Sparks from Detroit .....Page 2
Ford dealer installs new super-service features .....Page 3
Editorial: "Mass Production Justifies Itself" .....Page 4
Contemporary comment .....Page 4
News in the truck and bus field Page 5
Engineering news .....Pages 6, 7
Studebaker sales in fourteen states top 1930 record.....Page 9
Chevrolet sales in January show gains in New Jersey .....Page 10
Northwest sales up in January Page 10

REFERENCE TABLES

Cumulative January new commercial car registrations .....Page 5
Cumulative January new passenger car registrations .....Pages 6, 7
Major specifications and mechanical details of commercial cars Pages 8, 9, 10
Passenger car equipment and accessories .....Page 11

Marmon Adopts N.A.C.C. Plan for New Model Offering

INDIANAPOLIS, Feb. 19.—Giving immediate approval to the recommendation of the National Automobile Chamber of Commerce that all new models be presented simultaneously in November or December of each year, G. M. Williams, president of the Marmon Motor Car Company, has announced that in the future Marmon will follow this policy in introducing new cars to the public.

In setting forth this decision, Mr. Williams stated that the N. A. C. C. recommendation, made only a few weeks ago by the board of directors, had met with the unanimous approval of Marmon officials, who regarded it as one of the outstanding steps toward stabilization taken by the industry in recent years.

"Marmon is confident that such a step eventually will lead to placing the automobile industry on a sounder and more substantial basis," Mr. Williams said. "Not only will the simultaneous introduction of new models by all companies lead to a more uniform and more stable business to the manufacturer, but it will place the dealer on a firmer footing and be of real benefit to the motorist.

"It seems only a question of time that uniform new car announcements will be made by all companies, and when this becomes a fact it is certain that manufacturers, dealers and owners will find themselves in a much more advantageous position. No longer will

(Continued on Page 2)

Winona, Minn., Dealers Solve Used Car Problem

(Continued from Page 1)

accomplished by having a "used car market." This has been attempted before, but for various reasons never has worked out in the ultimate. Back of the Winona used car market there are certain fundamentals which may be listed somewhat as follows: banker contacts, immediate disposition of used cars, close cooperation among the dealer members, no partiality or favoritism, ability to pass title to purchaser, local financing and efficient operation of the used car disposal agency. The Winona idea was proposed and has been developed by Frank G. Browne of that city.

In effect the Winona used car market is owned by the seven dealers who subscribe to it. The market handles all used car deals for the member dealers. During 1930 the mart began the year with a stock of 276 used cars, not including junkers. During the twelve months the market sold 1,242 cars, about 1,000 of which were vehicles taken from the dealers during the year. At present the stock of used cars on hand is under 100, all the units none older than 1927.

Of the 1,242 used cars sold by the market during 1930, repossessions have been necessary in but eighteen cases and these deals were all cleaned up at a profit. The used car market sells a car only if the purchaser can make a down payment of 40 per cent. of the price. All financing is done by local bankers, each financial institution in Winona having a representative on the board of the market.

The member dealer who has a customer wanting to trade in a used car takes him with the vehicle to the used car market. The trade-in is appraised. The appraisal form is in duplicate, the dealer getting one and the market retaining the other. When the market first opened the system was a little different. At that time the customer got the appraisal sheet. One ingenious gentleman changed a "2" into a "3" on a blank, took his car to an outside dealer and got $125 more for his used car than the appraisal actually intended.

If the customer accepts the appraisal and turns in his used car the dealer immediately gets 40 per cent. of the value of the car and a credit slip for 50 per cent. The credit slip is cashed by the market when the car is sold. The remaining 10 per cent. is retained by the market to pay its cost of operation. If a car owner wants to have his vehicle appraised for his own private information, a fee of $5 is charged by the used car market for this service.

The used car market enjoys trade from a territory as far as seventy-five miles from Winona. It has the indorsement of the local banks, the Kiwanis Club, the Winona Chamber of Commerce and the seven dealers who are members. Only one dealer has dropped out of the market, and he moved from Winona to take on a larger territory. Three dealers in the town are outside the market, and there were formerly four, but one went out of the automobile business.

The used car market has a staff consisting of H. J. Homer, manager and appraiser, one other appraiser, one stenographer, two porters and from three to seven salesmen, according to the season.

Summed up, the opinions expressed by Winona dealers indicate that they consider the used car market a success, because it transforms used cars from frozen assets in the dealers' hands to liquid assets in possession of the market. The elimination of all expense on the dealers for storing, cleaning and selling used cars. The abiltiy which it gives the members to devote all their time and all the time of salesmen to selling new cars. This concentration of effort makes for efficiency in display and sales of new vehicles.

Whatever may have been the outcome of similar attempts in other cities, Winona is firmly convinced that its used car market is the solution of the used car problem.

FINANCING RETAIL CAR SALES IN 1930 TOPS 1928

(Continued from Page 1)

dustry, retail financing in 1930 topped the record for 1928, when the total amounted to $1,196,544,696 which was placed on 2,469,658 cars.

Figures, made public today by the Department of Commerce on the basis of reports received from 492 automobile financing organizations, reveal that in the last month of 1930 there was a sharp upward turn in both wholesale and retail financing.

Of the total number of cars financed in December, 37 per cent. were new models, 60.4 per cent. used cars and 2.6 per cent. unclassified.

Wholesale installments increased from $29,784,077 in November to $35,603,040 in December.

Retail installment sales totaled 167,834 cars in December, exceeding the figure for January, 1930, and that of 152,802 units for November. For the year the average value of new and used cars sold on time payments was $411 as against $456 in 1929 and $484 in 1928.

New car financing in December reached 62,031 units on which $35,437,285 was advanced as compared with 54,805 units on which $31,869,227 was advanced in the previous month. The average price of new cars for the years was $571, as compared with $595 in the previous year and $635 in 1928.

A steady reduction in the price of used cars is reflected in the figures in this classification, the average for 1930 being $279, as against $296 in the previous year and $307 in 1928.

Used car financing took a jump in December with a total of 101,404 on which $28,808,846 was advanced, as against 94,364, representing $26,915,013 in November.

The trend in favor of used car buying and reduced prices is reflected in the total financing for 1930, showing that 1,563,645 units were sold on installments, as against 1,555,838 in 1929, although the 1930 volume amounted to $436,857,409, while that for 1929 was $1,555,838. The comparative figures by months follow:

PORTLAND SHOW REVIVED CAR SALES

(Continued from Page 1)

Skipper, the Pennzoil Company, who spoke on "The Art of Leadership." H. W. Drake was chairman of the meeting.

Dealers this week are conducting a city-wide display of used cars.

Over a million dollars' worth of good used cars were being offered at aggregate savings to the buyers in excess of a quarter of a million dollars.

Thirty-five dealers are participating in this event, displaying an emblem with the association name and "Reliable" on it.

OIL TRADES OF NEW YORK HOLD ANNUAL BANQUET

New York, Feb. 19.—The fifteenth annual banquet of the Oil Trades' Association of New York was held last night in the grand ballroom and adjoining suites of the Hotel Roosevelt. More than 500 members and guests were present.

The reception started at 7 o'clock, the committee being composed of the directors of the association headed by Clifford T. Weihman of the Smith-Weihman Company, and president of the association. Following the reception dinner was served at 7.30 o'clock.

The guest of honor, Sir John Ballinger, Scottish journalist, entertained the banqueters with a humorous speech which lasted for about a half hour. Incidentally this was the only speech of the evening.

CLASSIFIED ADVERTISEMENTS IN THE AUTOMOTIVE DAILY NEWS BRING RESULTS

VANE AT ST. PAUL DEALER MEETING

St. Paul, Feb. 19.—C. A. Vane, general manager of the National Automobile Dealers' Association, addressed St. Paul and Minneapolis car dealers at a dinner given last week at the St. Paul Athletic Club, at which the St. Paul Automobile Dealers' Association was host to the Minneapolis Auto Trade Association.

Mr. Vane in speaking of the present condition of the automobile industry, compared it to the operation of a gold mine where all rich veins had been exhausted and was down to a very small yield per ton mined but because of a close check on all its operations was showing a satisfactory profit. "Car dealers," said Mr. Vane, "by keeping in touch with all details of their business, can also show a satisfactory profit even though sales volume is not as high as some years in the past."

H. E. Warren, president of the St. Paul Automobile Dealers' Association, presided at the meeting. Other speakers were D. A. Odell, president of the Minneapolis Auto Trade Association; Arnon N. Benson, manager of the Minnesota Motor Trades Association, and C. L. Holt of Holt Motor Company, Chrysler distributors, St. Paul, Minneapolis and Duluth.

JANUARY NEW TRUCK SALES SHOW UPTURN

(Continued from Page 1)

Following are the new commercial car registrations for the twenty-three states and the District of Columbia for January, 1931, as compared with the corresponding month of last year and December, 1930:

	Jan., 1931	Jan., 1930	Dec. 1930
Alabama ...	255	710	250
Connecticut.	194	237	265
Delaware ..	70	66	61
Florida	932	829	685
Idaho	182	84	73
Illinois	2,005	2,427	587
Maryland ..	280	334	339
Minnesota .	500	435	322
Missouri ...	313	513	507
Montana ...	182	233	19
New Hamp..	32	46	53
N. Carolina.	463	599	406
No. Dakota.	98	166	30
Ohio	980	1,470	1,670
Oregon	301	148	127
Pennsy.	1,329	1,755	2,370
Rh. Island..	88	72	90
So. Carolina	315	570	193
So. Dakota.	193	351	112
Utah	83	146	56
Virginia	352	768	338
W. Virginia.	251	329	304
Wisconsin ..	654	873	293
Dist. of Col.	100	163	126
Totals 10,152		13,324	9,276

MARMON APPROVES NEW MODEL PLAN

(Continued from Page 1)

the man who buys a car wonder just how long it will be before his new car is replaced by a newer and better model of the same make. He will know when to expect the new model, and if he likes the car he is considering, he will not feel disappointed at an unexpected change.

"Nowadays, except in the introduction of a brand new automobile such as the Marmon Sixteen, the majority of new cars are, basically, improved models of the same line. The characteristics are the same as far as general design is concerned. Surely it seems the most logical thing for the greatest good of all to have these improvements announced by all companies at the same time.

"The new policy will enable manufacturers to work more intelligently toward the improvement of their products. It will enable dealers to get their businesses in order to make way for the introduction and display of the new cars. It will give the automobile shows a distinct impetus, since these exhibits will provide something really worth while for the public to see. And Mr. and Mrs. Public will know just where they stand in regard to the purchase of their new car."

SPARKS from DETROIT

Histed Back in Harness

* * *

Ethyl Spreads Joy

* * *

Air News

* * *

Chris Sinsabaugh—Detroit Editor

IT was just a cessation of hostilities, that temporary retirement from the industry of one of its most prominent distributors, for the hat of J. R. Histed is once more in the ring and again he is in the war for business. This time, however, his base is in Milwaukee and Chicago loses one of its outstanding automobile figures.

There comes from Chrysler headquarters here today the announcement that Histed has succeeded George W. Browne as Chrysler distributor in the Milwaukee sector. As soon as a new shingle can be painted the doors of the Histed establishment will be thrown open to the public.

Inasmuch as Histed lives half way between Chicago and Milwaukee anyway, it is not going to make much difference in his commuting, but it means that he will have to retire as president of the Chicago Automobile Trade Association, a position which he has filled with credit for several years.

Histed is a man with an automobile past. Eleven years ago he came from Minneapolis, where he had been a Hudson-Essex man, to take over the Hudson-Essex franchise in Chicago. Last summer, though, he shut up shop there and since then has been looking around. It might be mentioned, too, in passing, that he is a past president of the National Automobile Dealers' Association. Coincidentally, George Browne, whom Histed succeeds as Chrysler distributor, and who has just taken on the De Vaux, was the first president of the N. A. D. A.

* * *

ONE can imagine the glee of those advertising salesmen who call on the Ethyl Gasoline Corporation, over the announcement that this big customer plans to increase its advertising budget 30 per cent. this year. It spent the mere sum of $2,000,000 in 1930 and its licenses chipped in another ten million, establishing a record—a product on which more advertising money has been spent in any one year than any other single product in the world, so it is said.

Gossiping around in Detroit among those who know of the development of this famous detonation eliminator, I have had my memory jogged as to the early struggles of C. F. Kettering to convert an idea into a commercial certainty.

* * *

I'M told that as far back as 1911, when Kettering was fussing around with his electric self-starter, he encountered the gasoline knock, so-called, which was only beginning to come in as a trouble. But he did not get around to probing further into the subject until he had mastered his farm-lighting outfit. That out of the way, he called in Thomas Midgley, Jr., and in 1915 Ethyl was born.

The experiments started with iodine. That did the work, but iodine, they decided, was impractical because of the cost, etc. Dyes failed them, although aniline, a base of dyes, prove more practical, but was not just what they wanted. They kept on trying, did Kettering and Midgley, until they discovered the lead which is now the base of ethyl.

* * *

ETHYL really is not the name of anything that exists as such, I am told, but is part of something else. Really, it is a chemical name and to its adoption as applied to the compound that is dropped into gasoline to eliminate detonation is credited much of its widespread popularity. It is colored red, of course, for identification purposes and as is well known, it is a compound that is put into gasoline itself.

It is made at the Du Ponts' Deepwater plant near Wilmington, Del., and it is a matter of record that the first concern to sell Ethyl was the Refiners Oil Company of Dayton, O. At the present time there are ninety-five refiners licensed to sell it, and it is reported that about 20 per cent. of all gasoline sold in this country to motorists is ethylized.

* * *

IN one way Charles A. Lindbergh and Ben G. Koether have something in common—both have met the President of Mexico. The director of the sales division of General Motors is on an inspection tour of our sister republic and this column is informed of the formal reception of the General Motors executive by Mexico's ruler.

Ford Dealer Installs New Super-Service Features

Thomas B. Martindale, Inc., Effects Additional Economies, Improves Efficiency by Novel Changes in Layout of Station

UNUSUALLY complete servicing facilities, including the most improved super-service station features with a "safety lane" recently installed, are now offered by Thomas B. Martindale, Inc., progressive Ford dealer, 3201 North Broad St., Philadelphia. By this means the dealer has been able to effect additional economy and highly improve efficiency in the department.

Martindale's service department affords 17,000 square feet of floor space laid out on the bay system, with forty-three working bays and there is a mechanic for every place a car can be stationed for repair work, while in addition there are seven inspectors, a foreman and a superintendent. Heretofore, cars brought in for repair work were handled three times and three spaces provided for each car. First, there was a receiving department where a corps of trained men were stationed to diagnose the trouble, write the shop order and then the car was driven up a ramp to the second floor where it was bayed and the necessary repairs were made. Afterwards the car was inspected and removed to another section of the first floor, to be held until the customer called for it.

To improve this situation it was necessary to remove a large wall on the first floor, dividing the receiving department and the repository, and throw these two sections into one, and the entrances were rearranged so that there would be an in aisle and an out aisle forming a "U," so that there would be no confusion of traffic. A customer now coming in for service is immediately approached at the door by one of the service inspectors, who, while talking to the customer, puts on a clean wheel cover and gear shift cover and gets back of the wheel. After learning the nature of the work the customer wishes performed the inspector proceeds to bay the car, but first takes the customer over the traffic lane located in the middle of the main in aisle, where he is driven over the wheel aligning test machine and the Weaver brake testing machine, giving every customer who enters for any purpose whatever a reading he can understand, showing the condition of the brakes. Very frequently, customers remark their brakes are holding all right, but after reading the gauges they soon see that all of the braking is being done on one or two wheels and that they should be equalized.

This, it has been found, inspires them with more confidence than taking the mechanic's word. No charge is made for this inspection, and customers are not urged to have their brakes adjusted. It is not necessary to urge, for as a rule, the customers seem just as anxious to have them right, after receiving the information, as is the service department.

Martindale's not only gets considerable repair work by having this machine, but insists that on every car on which a brake adjustment is made the reading on the machine must be correct before releasing the car. By using a machine of this kind to determine the effect of a brake adjustment, the department saves the customer's tires considrable hard strain and wear as compared with the old method of skidding them over the floor to see which wheel is pulling hardest, and it shortens the time considerably for the adjustment.

On baying the car, there is, at each available space where a car can be placed, a mechanic waiting to start immediately the car is bayed. He is equipped with a portable "tool-toter" of the concern's own design, with a full set of high-priced tools kept in immaculate condition and neatly arranged in the top tray, the lid of which locks, for protection to the tools when the mechanic is off. As soon as the car enters the bay, the mechanic pulls out one section of the "tool-toter," containing fender, cowl, door, seat covers and so on, and covers the car up, while the inspector is taking the order for the work to be done. The high standard of cleanliness, the mechanic being in white, and the care the customer sees being given to his car are very impressive.

The customer is privileged to stand by his car and see the work performed, which has several advantages. First, as the mechanic pulls out material unfit for further service, the customer sees it and passes on it; whereas, if the material is installed in the shop where the customer is not permitted, he is always skeptical and frequently asks to see the material which is removed, taking considerable of the foreman's or superintendent's time explaining why it was necessary to remove it. This is now reduced to a minimum. Then, the customer with the mechanic watches his car's general appearance from the outside and will notice dents in hub caps, fenders and the like, probably more than he ever has before, which makes it easy for the mechanic to sell him additional work.

Heretofore many dealers have objected to customers being in the repair shop, because of the amount of the mechanic's time they take by talking to him about their trips and various other things.

"We have overcome this," says Mr. Martindale, "by installing an inexpensive radio set which is loud enough to make talking a little difficult, but not too loud to interfere with what has to be said. Then a customer's mind is pleasantly distracted from any attempt at general conversation by music. You eat your meals by music; why shouldn't you repair cars by music?"

Martindale's find that many of their customers now wait for the repairs to be made on their car, thus removing it immediately; whereas, heretofore, the system did not permit them to tell a man when his car would be started, or exactly when it would be finished, frequently resulting in his calling next day and burdening the department with the necessity of providing space to accommodate the car longer than necessary.

The same men who inspect cars and write the tickets also inspect the cars after the mechanics have finished before delivering the cars to customers.

There is a progressive wash lane branching off from the main entrance, where the car is first vacuum-cleaned inside, the top, sides and motor then being washed. Next, the car goes on to a Curtis lift, enabling a first-class job to be done underneath and on the wheels. The charge for this is only $1.50. Martindale's is trying to encourage customers to have their cars washed before greasing, for much better results can be obtained when greasing through clean connections. Clean motors also are much better for the men to work on, and while the department can reap a direct benefit at $1.50, it is felt there is considerable additional profit in the aid the washing feature gives to the repair work. Customers can pass alongside a clear glass, steel-frame partition and see all of this work being done.

At the end of the wash lane are located the lubricating racks. Such a high standard of cleanliness is maintained here that ladies often watch their work being performed, in preference to going into the waiting room.

An innovation, original and remarkable, is the uniforming system for the men in the service department. All wear white, with the words "Martindale Service" across the back on the shoulders, the coloring of the letters matching the cap, which differs for each group. The doorman wears a ship officer's white cap with black visor; porters and apprentices wear a red trench cap; fullfledged mechanics a blue trench cap; inspectors and testers a green one, and foremen a white one. All except foremen wear a jumper, the latter wearing a white coat.

A special file card furnishes at a glance a complete analysis of what the customer has had done to his car, supplying information such as date, mileage, job number, amount of money spent, inspection, greasing, oiling, brakes, wheel alignment, wash and general repairs. A glance at these cards reveals those who are purchasing general repair work, but have not yet availed themselves of the special wash operation. In such cases, direct mail advertising is sent out immediately, to get them to have their car washed, telling them at the same time the advantages of lubricating a clean car. After a car owner has been made a wash customer there is little difficulty in making him a lubricating customer, and if he is a lubricating and wash customer, he never has to be asked for his repair work.

Said Mr. Martindale: "We have reached a point where considerably more than 50 per cent.—possibly 75 per cent.—of our repair customers are people who have purchased cars from other dealers. This is instantly noted because of the difference in the colors of the file cards in our cabinet, one color representing cars purchased from us, and the other, cars purchased elsewhere.

"Our direct-by-mail advertising is sent to those on file and we are not soliciting additional repair customers. We have sufficient customers on file now, who, in consideration of those being added almost daily through the sale of new cars, will keep our place running at full capacity. What we do solicit, however, is the opportunity to supply all the needs of the customers now on file.

"We had the highest sale of labor in December and January that we ever had in the history of our business, in spite of conditions, and we firmly believe that by the middle of March we shall be running 200 to 225 cars through this department in a day.

"After removing the repair work from the second floor, we immediately turned that floor into a new and used car display room, where 100 cars can be placed and shown to advantage. We feel that this makes a decided impression on a customer when taken into such a large showroom, as compared with just having one or two cars on hand, and 75 or 100 over at some warehouse, or garage, where you do not get the benefit from a sales standpoint that you do when a customer sees what a large stock is available for his selection."

Holds Own Car Show

Anton & Mersch Motors Inc.
Cordially invite their many patrons and friends in
BERGEN COUNTY
to attend the special exhibit of Chrysler cars at their showroom where a complete line of the new
Chrysler Eights and Sixes
will be on display during
Automobile Show Week

Owing to the fact that there is no Auto Show held in Eastern Bergen County, we are arranging a Special Exhibit of all Chrysler models at our showroom for the convenience of our many Bergen County friends.

Anton & Mersch Motors INC.
408 Broad Avenue, Palisade Park, N. J.
TELEPHONE: LEONIA 4-0868

THE ANTON & MERSCH MOTORS, INC., Chrysler dealer of Palisades Park, N. J., decided to hold its own automobile show in its showroom when the eastern Bergen county dealers voted to eliminate the joint exhibit for 1931. The ad copy, reproduced above, was used to attract buyers, and many sales were traced directly to it

AUBURN RETAIL SALES TOP DECEMBER AND JANUARY LAST YEAR

New York, Feb. 19.—Retail sales of new Austin passenger cars in the first fourteen states to report registrations for January showed an increase not only over December, 1930, but were greater than in January, 1930, according to the sales statistics.

Auburn registrations in the fourteen states amounted to 435 in January, as compared with 213 in the preceding month, a gain of 104 per cent., and compared with 86 in January, 1930, an increase of 405 per cent.

The states reporting are Delaware, Florida, Idaho, Illinois, Maryland, Minnesota, Missouri, North Carolina, North Dakota, South Carolina, South Dakota, Utah, West Virginia and Wisconsin.

In eight of these states Auburn registrations in January exceeded those of the corresponding month of last year. They were Delaware, with sales of 1, as against 0; Florida, 10 to 5; Illinois, 276 to 49; Maryland, 4 to 3; Missouri, 48 to 4; South Carolina, 1 to 0; West Virginia, 3 to 2, and Wisconsin, 87 to 6.

In the nine states of Delaware, Florida, Idaho, Illinois, Minnesota, Missouri, South Carolina, West Virginia and Wisconsin, sales of the Auburn in January exceeded those of December.

Following are Auburn registrations in the fourteen states for January, as compared with January, 1930, and December, 1930:

	Jan. 31	Jan. '30	Dec. '30
Delaware	1	0	0
Florida	10	5	5
Idaho	1	1	0
Illinois	276	49	189
Maryland	4	3	5
Minnesota	4	4	1
Missouri	48	4	1
N. Carolina	0	4	4
North Dakota	0	0	0
S. Carolina	1	0	0
South Dakota	0	4	0
Utah	0	4	0
West Virginia	3	2	2
Wisconsin	87	6	6
Totals	435	86	213

REO NAMES H. G. JOHNSON

Minneapolis, Minn., Feb. 19.—H. G. Johnson has been named assistant manager of the Minneapolis office of the Reo Motor Car Company, L. D. DeLiguori, regional sales manager, has announced. Mr. Johnson took part in the group meetings conducted for dealers attending the Northwest Automobile Show at the fair grounds.

Automotive Sales Near Top In Indiana and Ohio Census

WASHINGTON, Feb. 19.—Latest releases of figures on the 1930 census of distribution by the Bureau of Census, Department of Commerce, include a group of cities in Ohio and a further report from two Indiana cities. The Ohio cities' figures are as follows:

Retail business in Alliance, O., was in excess of $13,000,000. The 1930 population of Alliance was 23,047.

The food group takes the lead in this report, with the automotive group second and the lumber and building group third in order of sales.

The automotive group, with sixty establishments, does a business of $3,001,842, or 22 per cent. of the total retail business. Receipts in thirteen motor vehicle establishments amount to $2,140,872 and sales in twelve accessory, tire and battery stores to $215,878. A total of twenty-six filling stations is reported with aggregate sales of $564,119 in gas, oil, tire and other accessories. This merchandise is also sold in nine garages whose total business of $80,973 includes receipts from repairs and storage.

Retail business in Ashland, O., was in excess of $7,000,000. The 1930 population of Ashland was 11,141.

The automotive group takes the lead in this report, with the food group second and the general merchandise group third in order of sales.

The automotive group, with forty-one establishments, does a business of $2,128,471, or 29 per cent. of the total retail business. Receipts in twelve motor vehicle establishments amount to $1,462,427, and sales in eight accessory, tire and battery stores to $179,844. A total of fifteen filling stations is reported, with aggregate sales of $435,900 in gas, oil, tires and other accessories. This merchandise is also sold in six garages, whose total business of $50,300 includes receipts from repairs and storage.

Retail business in Ashtabula, O., was in excess of $15,000,000. The 1930 population of Ashtabula was 23,301.

The food group takes the lead in this report, with the automotive group second and the lumber and

(Continued on Page 12)

Automotive Daily News

"Of, By and For the Entire Automotive Industry"

Published Every Day Except Sunday and Monday by
AUTOMOTIVE DAILY NEWS PUBLISHING CORPORATION,
350 Hudson St., New York, N. Y.
O. J. Elder, President. H. A. Tarantous, Vice-President. Alexander Johnston, Secretary.

Entered as second-class matter August 27, 1925, at the post office at New York, N. Y., under the Act of March 3, 1879.
2716 Graybar Bldg., New York, N. Y. Telephone MO hawk 4-6388

Distribution—Net paid Average over 10,000 daily guaranteed.
Member A. B. C.

FRIDAY, FEBRUARY 20, 1931

ADVERTISING AND BUSINESS HEADQUARTERS

Harry A. Tarantous, Business Manager J. Edward Schipper, Eastern Manager. George M. Slocum, Manager Detroit Bureau, 427-8 Fisher Building, Detroit, Mich., phone Empire 3500; Willard R. Cotton, Western Manager, 333 North Michigan Ave., Chicago, Ill., phone Central 5936; Metz B. Hayes, New England Manager, Little Building, Boston, Mass.; Blanchard, Nichols & Coleman, American National Bank Building, San Francisco, Cal.; Lincoln Building, Los Angeles, Cal.; 1037 Henry Building, Seattle, Wash. Address ALL advertising and business correspondence to 2716 Graybar Building, New York City.

EDITORIAL DEPARTMENT

350 Hudson St., New York, N. Y. Telephone CAnal 6-1000.
Alexander Johnston, Editor. William C. Callahan, News Editor.
Detroit Bureau—Chris Sinsabaugh, Editor, 427-8 Fisher Building, Detroit, Mich., phone Empire 3500. Contributing Editor, John C. Weldmore. A. Benson Carleton, Technical Editor.

Mail subscriptions to CIRCULATION DEPARTMENT—C. H. Wilson, Manager.
1926 Broadway, New York, N. Y. Telephone TR afalgar 7-4500
Subscription Rates—One year, $12.00; two years, $20.00, for United States and Canada.
To Foreign Countries—One year, $15.00; two years, $26.00. Single copies, 5 cents.

Mass Production Justifies Itself

DURING the past year of business depression complaints have occasionally been heard to the effect that mass production has been the basic cause of our economic ills. Production has outstripped the ability of the people to consume, has been the tenor of these complaints.

There is no question that the growing productivity of American industry has crowded distribution and consumption too far. The maximum production possible by our factories would flood our markets beyond any hope of economic consumption. In an industrial life such as exists in the America of today, development of time and labor saving machinery frequently causes troubles of the sort that we have been through. Inventors of machines speed up production by increasing the efficiency of industry, so that periods arrive when consumption has not broadened sufficiently to take care of the increased output. Inevitably this means that production must be decreased and employment must drop. We have been through precisely such a period, the effect being enhanced by a worldwide period of depression and decrease in consumption.

Faced with this situation mass production has only one recourse, if it is to justify itself. It must show that not only is it capable of increasing output, by lifting the efficiency of the individual, but that it can lower costs and consequently prices, by the very efficiency that has helped cause the trouble. If it can do this it will open new consumer fields and broaden purchasing power to assimilate the increased production it has created.

We submit that in the American automotive industry this is exactly what mass production has done during the difficult year of 1930. The vehicle manufacturers, in spite of lower sales volume, have managed to better their products to an astonishing degree and still lower the prices. The automotive buyer of 1931 is getting more for his dollar than ever before. When the full effect of this achievement of mass production becomes evident, consumption will again "take up the slack" and the automotive industry will once more enjoy normal prosperity.

Regulating Competitors

AUTOMOTIVE DAILY NEWS has spoken many times of the present campaign of the railways to impose Federal regulation on motor truck and motor bus transportation. We have seen in this campaign an attempt to "regulate" these competitors of the railways out of business.

In a recent article Merle Thorpe, editor of the Nation's Business and one of the sanest commentators on business that we have, makes some interesting comment on this railway campaign. "The railways ask for adequate regulation of motor bus and truck operations," says Mr. Thorpe, "with no discriminatory provision against the railroads operating in the same field. I am disappointed that they did not ask for a relief from their own excessive regulation, rather than wishing similar regulation upon their competitors. I am disappointed that they have asked to have their competitor shackled.

"I believe in regulation of those businesses which are for the necessary use of all the public. I do not believe in excessive regulation and my observation in Washington has been that once regulation is started, it grows like a mushroom. There is never any diminution; there is always added this and that until the very economic freedom of the individual or business or industry is whittled away."

If the railways have a real grievance, perhaps they would have done better had they asked for relief from their own ills, rather than by attempting to have those same inflictions applied to a competitor, which, after all, has potentialities as a positive ally.

ABOUT TIME TO STOP THIS!

The Above Cartoon Is Reprinted From The *Auto Tax Bulletin* Of The *Auto Tax Relief Association of Florida.*

BUFFALO A. M. A. HEARS TALKS AT DINNER SESSION

Buffalo, N. Y., Feb. 19.—More than 150 maintenance men attended the semi-annual meeting and dinner of the Automotive Maintenance Association of Buffalo at the Buffalo Orpheus Club House. William H. Smith, Sr., chairman of the committee on arrangements, was chief speaker. Other speakers were Fred G. Ferguson, Cleveland, O.; Eugene Simonson, Brooklyn, N. Y.; Harry Joyce, Chicago, and Fred J. Kelverer, president of the local association.

SEES BUSINESS GAINS

Seattle, Wash., Feb. 19.—R. W. Lee, head of Lelin Sales Company, Portland and Seattle, was in Seattle conferring with the manager of the local branch. Mr. Lee reported gains since the first of the year in automotive equipment and tools

COMING EVENTS

FEBRUARY

14-21—**Trenton, N. J.** Automobile Show.
16-20—**San Francisco.** Society for Steel Treating National Western Metal and Machinery Exposition.
21-28—**San Francisco.** Automobile Salon.
21-28—**Quebec, Canada.** Automobile Show.
22-March 1.—**Los Angeles.** Pacific Coast Transportation Exposition at Shreve Civic Auditorium.
22-28—**Des Moines, Ia.** Automobile Show at Coliseum.
23-28—**Springfield, O.** Automobile Show.
24-26—**Columbus, O.** Ohio Petroleum Marketers' Association meeting.
24-March 1—**Seattle, Wash.** Automobile Show at Civic Auditorium.
25-March 2.—**Camden, N. J.** Automobile Show.

MARCH

6-15—**Geneva, Switzerland.** Eighth Swiss International Automobile Show.
7-14—**Brooklyn, N. Y.** Automobile Show.
9-14—**Wichita, Kan.** Automobile Show at Forum.
11-13—**Detroit, Mich.** Michigan Oil Men's Association meeting.
16-22—**Los Angeles, Cal.** Second Annual Oil Equipment and Engineering Exposition.
19-21—**San Antonio, Tex.** Sixteenth annual meeting, American Association of Petroleum Geologists.
30-April 3—**Indianapolis, Ind.** Eighty-first meeting, American Chemical Society.

MAY

4- 9—**Charlotte, N. C.** Good Roads Convention.
9-Aug. 9—**Berlin, Germany.** International Garage Exposition.

JUNE

15-19—**White Sulphur Springs, Va.** Annual summer meeting, Society of Automotive Engineers.

SEPTEMBER

26-Oct. 2—**Atlantic City, N. J.** Annual

NOVEMBER

10-12—**Chicago, Ill.** Annual meeting, American Petroleum Institute, Hotel Stevens.
meeting, American Electric Railway Association.

Contemporary Comment

WITH all the criticism that has been leveled against the "new era" notion of a few years ago, there is reason to fear that it is still doing harm. Was not that very notion one of the great causes of the depression? It could not have been a cause if it had not been a mistake and certainly the first duty is to get rid of mistakes. We must set our mental house in order.

Talking about "confidence" as an influence toward better times represents in no small part the spirit of that old "new era," for the confidence of that time was largely misplaced, and we have had the additional experience of a year ago, when months after the stock market collapse there was still too much confidence, as events in the remainder of the year proved.

Watching the stock market is another survival. When the market was booming people looked at it instead of at fundamental economic conditions. Many men felt at the time that they could hardly see reason for so much activity and such strong hopes, but there was the stock market, and how could it be wrong? When we know that the stock market misled people so badly, it is hardly the time to trust it again. It may not have gone down far enough to adjust itself to economic conditions already existing, in which case it will decline further. It may have gone down too far, in which case it will advance. In either case it would be no guide, no index to conditions already in existence, much less a prophecy as to what is coming.

Indeed, survival of the "new era" notion is shown by the strong disposition to compare and to measure this depression with those of the past. That is in essence a denial that new mistakes were made. The times that preceded this depression were different from the times that preceded other depressions, and the present physical and mental conditions are different from those in other depressions. On the mental side the most striking difference is the tremendous amount of talk there is about it.

In past depressions the mental attitude was that one must saw wood. Even though we face a new set of economic conditions today, that attitude is still a wholesome one, worthy of wider adoption. It is time for less talk about the future and more assiduous application to the problems of the present.—**Iron Age.**

* * *

STATE and local agencies in the thirty-six states which lie in the snow belt cleared snow and ice from 199,348 miles of state and local highways in the winter of 1929-30, according to reports to the Bureau of Public Roads of the United

(Continued on Page 11)

News of Activities in the Truck and Bus Field

January Truck Sales Equal To Year Ago in Phildelphia

PHILADELPHIA, Pa., Feb. 19.—**Truck sales, in most cases, for January either were about equal to those of the corresponding month a year ago, or did not quite come up to that level. The month of February, however, has started out encouragingly, in a number of instances showing improvement over the first two weeks of 1930, and with a good inflow of inquires.**

Some dealers report that the movement in dump trucks and for the heavier vehicles used by contractors for road building and hauling heavy material, such as stone, is slow and that the season for these classifications appears to be late in starting. A few concerns state that queries among some such contractors indicate work in this line is so scarce that they have not even troubled to take out their licenses for 1931, while others assert there is an overstock of dump truck equipment in the hands of these haulers, so there has been no need to come into the market to purchase.

Some dealers increased their sales forces toward the end of the year just passed, but with the advent of the new year there has been little or no movement in this direction. Comparatively few large installations have been placed by truck dealers with any one industrial or mercantile concern since January 1.

Following are reports from the local field:

Mack-International Motor Truck Corporation, 42d Street and Woodland Avenue: "Our sales volume has been picking up thus far in February and is ahead of the like period last year. January sales, however, did not show up as well as the corresponding month of 1930. Trucks of 3½ to 5 tons' capacity are selling best at present. We recently made three good installations, although the largest was for ten units."

White Motor Truck Company, 20th Street and Erie Avenue: "Our February business, so far as it has gone, breaks about even with that of February last year for the period. January trade, with reference to the volume of business done by other companies, while fair, was not so good as it was for the first month of 1930. General inquiries are becoming stronger now, and there undoubtedly is a better aspect to the business outlook."

Thornton-Fuller Automobile Company, Dodge and Graham Brothers trucks, 24th and South Streets: "Our sales in January of the present year were about the same as those of a year ago; perhaps about ten units ahead. Thus far, February has not shown the volume produced for the period during the previous month. There is a tendency to wait until March. Our one-and-a-half-ton delivery truck has been selling best recently."

Sterling Motor Truck Company, 2633 Hunting Park Ave.: "Our truck sales for the first two weeks of February show a nice improvement over the previous month's first two weeks, and January of this year came out about the same as December, 1930, although it did not show as good a volume as January, 1930. The demand right now is divided between light and heavy truck models, and we have been selling a considerable number of units with six-wheel attachments. Among our recent sales were four five-ton trucks to a big ice cream concern."

INDEPENDENT BUS HEAD AIMS 4 BILLS AT P. S.

Trenton, N. J., Feb. 19.—Assemblyman Frank E. Schoenfeld of Hudson, president of the Independent Bus Owners' Association, has introduced four measures tending to curtail the Public Service Co-ordinated Transport throughout the state.

One of the measures, a joint resolution, would create a commission to investigate the Public Utility Commission and the Public Service Corporation and carries an appropriation of $100,000

The other three measures were in the form of bills. One would provide for the election of members to the Public Utility Commission instead ofappointment by the governor.

A second bill would place the Public Service Holding Company under the jurisdiction of the Public United Commissinon, and the third bill under the jurisdiction of the Public Utility Commission.

CLASSIFIED ADVERTISEMENTS IN THE AUTOMOTIVE DAILY NEWS BRING RESULTS

INCREASES HOLDINGS

Olympia, Wash., Feb. 19.—Plans of the Tacoma Bus Company, one of the largest motor bus operators in southwest Washington, to increase its holdings through purchase of the Tacoma-Fort Lewis and Tacoma-Bremerton stage routes, have been approved by the State Department of Public Works. The Tacoma-Fort Lewis line was formerly operated by the United Auto Transportation Company and the Tacoma-Bremerton line was operated by R. L. Stubbs.

WEST VIRGINIA REJECTS GAS TAX INCREASE PLAN

Richmond, Va., Feb. 19 (UTPS).—Proposal to increase the state gasoline tax from 4 to 5 cents a gallon has been rejected in the House of Representatives of the West Virginia Legislature, at Charleston, without debate. At the same time the House placed on its calendar a bill that would put a tax on the sale of cigarettes.

FORD TRUCK DISPLAY STAGED IN CAMDEN, N. J.

Camden, N. J., Feb. 19.—The truck division of the Ford Motor Company, Philadelphia, through the Camden Ford dealers, are holding an exhibition of eleven different types of commercial bodies, including almost every conceivable type from stake bodies to ambulances.

The caravan of commercial cars were shown at the Cramer & Myers salesrooms on Monday from 10 a. m. to 1 p. m.,; at L. L. Schroedel's from 1 to 3 p. m., and at the Haddon Motors Company from 3 to 5.

WISCONSIN AXLES

Wisconsin Axles alone may never close a sale. But they certainly make selling easier —with their reputation for dependable service.

WISCONSIN AXLE CO.
Oshkosh Wisconsin

Cumulative New Commercial Car Registration Statistics, January, 1931

Some of this data has been published previously, but it is given here complete for the convenience of oursubscribers.

Figures in this table are from R. L. Polk & Co. of Detroit, with the exception of Illinois, which are supplied by the Robinson Advertising Service, Springfield, Ill., and New Jersey, which are furnished by the New Jersey Motor List Co., New Car Division, Trenton, N. J. Readers desiring county, city or town lists, or lists of owners in any given section, may obtain these by addressing any of these three companies. Commercial Car Registrations do not include buses.

States	Autocar	Brockway-Indiana	Chevrolet	Diamond-T	Dodge	Essex	FWD.	Fargo	Federal	Ford	G. M. C.	International	Mack	Paige	Relay	Reo	Republic	Rugby	Sterling	Stewart	Studebaker	Whippet	White	Willys	Willys-Knight	Miscellaneous	Totals	States
Conn.	3	2	58		20	1				77	2	5	1	1		12					8		2	1		1	194	Conn.
Delaware		1	29		2					33	4												1				70	Delaware
Florida			307		20	1			1	504	1	51	6	1		10						2	21		5	2	932	Florida
Idaho	4		47		8			1		102	1	15				2		1							1		182	Idaho
Illinois	6	18	581	90	91			3	8	822	28	163	6	1	3	9	2	2	11	11		5	20	14		111	2005	Illinois
Maryland	4	8	85	3	8	1				117	5	21	7			6			2		4	1	3	2	1	2	280	Maryland
Minn		1	164	6	24			1	4	209	7	35	3	1	1	11	2				14		4	9		4	500	Minn.
Missouri	1	1	121	3	8	1		1	1	136	10	14	8						1				3	2		2	313	Missouri
N. Hamp.			10		2				2	17		†	1														32	New Hamp
Nor. Car.	1		224		25				1	185	1	13	1			2					1		2	3		4	463	Nor. Car.
Nor. Dak.			32		6					40	2	17												1			98	N. Dakota
Ohio	6	7	304	2	46	1			2	458	23	43	1			11	3	1	1	4	18	3	14	11	1	20	980	Ohio
Oregon			81		5		1	3	1	169	8	8	4			4	1		1		7		3			5	301	Oregon
R. Island			26		4				7	41	3	3	2			1					1						88	Rh. Island
S. Car		9	152		4				1	129	2	3	7			1					2		1			4	315	S. Carolina
S. Dakota		1	68	7	10		1			66	2	27		1		2					5	1		1		1	193	S. Dakota
Utah			28							34	5	4									4	1				7	83	Utah
Virginia	2	1	160		14				4	133	12	7	6		1		1			2	1		5			3	352	Virginia
West Va.			92	1	18			1		102	5	14	7								3		2	4		2	251	West Va.
Wisconsin		2	242	4	21		11		3	292	8	29				7			3	2	13		1	1		15	654	Wisconsin
D. of C.			27	1	9					46	3	3							2		1					8	100	D. of Col.
Totals	27	51	2838	117	345	5	13	10	35	3712	132	475	60	5	5	78	9	4	21	19	82	13	82	49	8	191	8386	Totals
Conn., '30	2		68	5	19			1	3	84	6	15	3			9				4	5	2	3	1		7	237	Conn., '30
Del., 1930	2	1	21		2					25	5	3	2			1						1	2			1	66	Del., 1930
Fla., 1929		3	292		20	2				440	6	27	1			12		2				6	18				829	Fla., 1930
Idaho, '30			26		5			1		41	3	4				1						1	1	1			84	Idaho, '30
Ill., 1930	11	6	649	112	108	4		26	18	917	75	201	17		1	51	1		18	4		43	28			137	2427	Ill., 1930
Md., 1929	3	9	98	4	17	1		1	2	117	9	26	10			11			2	1		1	7		3	12	334	Md., 1930
Minn., '30		5	112	4	18			4	1	221	6	28				18		1			2	4	4	2		5	435	Minn., '30
Mo., 1930	2	9	176	9	22				1	212	18	29	6			8					6	3	3			9	513	Mo., 1930
N. H., '30			16		3				1	20		2				2				1						1	46	N. H., 1930
N. C., '30		1	240	3	39	1		3		243	8	29	3			3	2	1			1	2	7	3	1	9	599	N. C., '30
N. D., '29			45		1			5		70	1	34				1		2				2		3	2		166	N. D., 1930
Ohio, 1930	9	4	436	8	52	3		10	9	656	43	77	7		4	35		5	2	3	4	20	34	10	7	32	1470	Ohio, '30
Ore., '30			25		11			1	3	73	6	7	1			6	1	6				2	2			4	148	Ore., 1930
R. Isl., '30	2		20	1	6			1		24	1	3	5			3							5			1	72	R. I., 1930
S. C., '29			268		21			1	1	243	5	20				5					1		3	1		1	570	S. C., 1930
S. D., '30			97		13	1		2		156	9	50				13		1				1		5		3	351	S. D., '30
Utah, '30			27		1					107		5				3						1	1			1	146	Utah, '30
Va., 1930	1	8	275		27			4	9	329	16	36	3		3	13	4			3	3	5	9	4		16	768	Va., 1930
W. V., '29		2	112	3	32			3	1	128	5	21				10				2	2	2	3		1	2	329	W. Va., '30
Wis., '29		2	264	6	38	1		3	13	389	15	49	4			14		2	11	4	3	4	2	13	3	33	873	Wis., 1930
D. C., '30	8	1	33.	1	25					67	11	2				2			1	2			7			3	163	D. C., '30
Totals	40	51	3300	156	480	13	†	66	62	4562	248	668	62		8	221	8	20	34	24	27	100	139	43	17	277	10626	Totals

†Carried in the Miscellaneous Column.

Production - - Engineering - - Factory -

The Personality of Steel

By B. F. SHEPHERD
Chief Metallurgist Ingersoll-Rand Company, Phillipsburg, N. J.

The following is an abstract of a paper presented before the Society of Automotive Engineers' meeting held in conjunction with the Western Metal Congress, which is now in session in San Francisco, Cal.:

IN the production of high quality parts of tool steel, the factors affecting the uniformity of the finished product must be controlled. Steel is purchased from various sources to a chemical specification often demanding unreasonably close limits and to meet certain physical standards of cleanliness gaged by fracture or deep etching inspection.

Design is criticized and altered to reduce the residual hardening stresses and to prevent undue concentration of service stresses. The latest hardening equipment, pyrometers and quenching sprays of special design are used.

Inasmuch as all of these factors have been regulated, uniform results are expected.

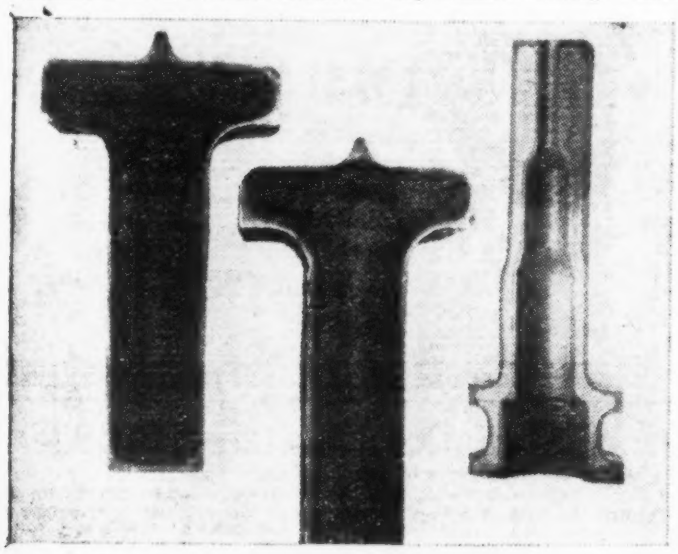


FIG. 1—Tools at left and center made of same bar, but center one quenched in conforming fixture. Tool at right shows performance of specialized hardening methods on steel of proper timbre

Unfortunately, uniform results do not always follow uniform heat treatment, for the steel has a definite personality. Personality is something which also characterizes human beings, cast in the same type of mold and probably having chemical composition within very narrow limits. The great confusion in existing data on steel is due to this difference in personality—a word which can be replaced to good advantage by the term "timbre." Steel may have a chemical composition well within the limits of a correct specification and yet be entirely unsuited for a specific use. A common example of this is hardened tool steel containing an appreciable percentage of carbon in the form of graphite. The chemical analysis would show proper carbon, but not all of it is in the combined form.

The steel making fraternity, in times not long since past called this difference in quality "body." "Body" in later years has been used to describe general quality characteristics and, very recently, the ability of tool steel to withstand repeated hardening without cracking (a test of rather doubtful value except for isolated service requirements). The term "timbre" has been defined in Technical Bulletin C of the Carpenter Steel Company, as the inherent "property of tool steel independent of analysis which influences the degree of hardness penetration and width of allowable quenching range."

It is the purpose of this paper to show (a) some hardening irregularities in tool steel, (b) the effect of timbre upon service life, (c) the necessity for the control of timbre, (d) the difference in timbre in the products of several manufacturers as shown by the hardenability test developed by the writer and published in "Transactions," A. S. S. T., Vol. 17, Jan., 1930, (e) the degree of abnormality, and (f) that timbre exists not only in tool steel, but also in various alloy steels.

It is often assumed that a 100 per cent. hardness inspection is a guarantee that the accepted parts are satisfactory. As a matter of fact, hardness tests only indicate the hardness at the particular location tested, and are not a guarantee that a certain quality standard is being attained. Etching a hardened tool steel part may discover a large number of soft spots on the surface, indicating improper hardening. It is therefore necessary to check the uniformity of hardening by means of additional inspection of this character, if highest quality is to be maintained.

Small soft spots on the surface indicate a structural condition often much more serious than ordinarily supposed. Cross-sections taken through several parts having surface soft spots show that the total depth of hardening in several locations is greater than can be obtained by a normal hardening operation, and consequently indicates a hardening abnormality. This can be explained only by internal cooling stresses causing a pressure hysteresis, which accelerates or retards the formation of martensite. Strains produced by such a structural condition are very much more severe than those produced in a normal hardening operation and render the part unsuitable for service.

No further argument is needed to emphasize the principle that great care must be exercised in the production of high-quality work to insure that all parts have the desired structural condition in every region and on all the surface. What is often called "satisfactory quenching apparatus" is not capable of reproducing the required quenching conditions.

Two parts made from the same bar of steel and quenched from the same temperature are shown at the left and center of Fig. 1. They were then cut in two with a thin emery wheel and etched to show the distribution of hardening. The part at the left was quenched in an open brine flush, in a manner that would ordinarily be considered improved hardening practice. Examination shows that the depth of hardening tapers off on one side to practically nothing, a condition which makes the part unsuitable for its intended use even though it does not show a single soft spot on the surface. The similar part in the center was quenched with what is known as a conforming fixture, whereby the brine was directed to all surfaces. A uniformly hardened product has resulted.

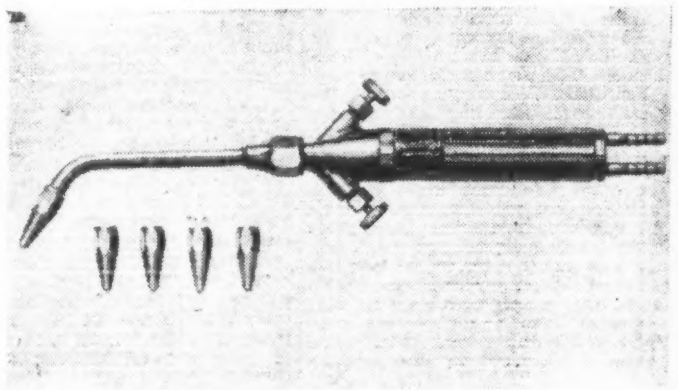
Timbre has been reported by other investigators as having an effect upon the service life. For instance, A. S. Jameson, in a paper entitled "Cold Heading Die Life," read before the 1930 A. S. S. T. Chicago convention, showed the relation between case depth and die production. One of his steels, which could be hardened one-quarter inch or deeper, gives 28,000 to 40,000 production per die end, whereas three others with shallower hardening characteristics gave production of 10,000 to 25,000.

We have found a marked effect of timbre upon the service life to parts made of one-inch solid hexagon steel, properly hardened and in the same physical condition with respect to hardness. Chemical composition of the two heats of this steel is very similar (carbon .75 per cent.). One hardens uniformly 7-64-inch deep and has a working life of 3,468 minutes. The other hardens less regularly 5-64-inch deep and has a working life of only 2,043 minutes.

Design also accentuates the necessity for the control of timbre. It is desirable on certain parts to have deep hardness in a certain location.

(Continued on Page 12)

New Welding Blowpipe Announced for Light Work



Prest-O-Weld Type W-107 Welding Blowpipe

THE Linde Air Products Company, New York city, announces the addition of the type W-107 welding blowpipe to its Prest-O-Weld line. It is suitable for light welding work of all kinds, it is claimed, and operates on the medium pressure principle.

The gases mix immediately in front of the handle and the oxygen and acetylene valves are so located that they can be readily adjusted with the thumb and forefinger of the hand which holds the blowpipe. The blowpipe is 10½ inches in length, weighs 10 ounces and is perfectly balanced, it is stated. Six different size tips are available for use with this blowpipe, although it is furnished as standard with five tips, Nos. 2 to 6, inclusive. The blowpipe possesses many advantages in operation, the manufacturers state, because of its size and light weight, and it can be readily handled where fine and accurate work is required.

The complete Prest-O-Weld W-107 welding outfit includes the blowpipe, a Prest-O-Weld Type R-106 oxygen regulator, Prest-O-Weld Type R-107 acetylene regulator, two 25-foot lengths of 3-16-inch hose, one pair of fiber spectacles, four hose clamps and instruction book.

CUMULATIVE NEW PASSENGER CAR

Figures in this table are from R. L. Polk & Co. of Detroit, with the exception of Illinois, which are supplied by the Robinson Advertising desiring county, city or town lists, or lists of owners in any given Some of this data has been published previously, but it is

States	Auburn	Austin	Buick	Cadillac	Chevrolet	Chrysler	Cord	De Soto	Dodge	Durant	Essex	Ford	Franklin	Graham	Hudson	Hupmobile	La Salle	Lincoln
Delaware	1		17	5	92	10		3	2	4	13	97				1	5	
Florida	10	41	103	14	1210	59	3	18	45	6	96	1121	10	48	60	16	4	4
Idaho	1	2	13	1	202	11		7	17	12	6	189		7	5	2		1
Illinois	276	22	581	86	3046	159	15	139	341	48	180	2123	34	71	125	79	47	37
Maryland	4		91	5	654	17		8	35	7	47	461	8	8	17	16	3	1
Minnesota	4	7	100	13	899	27	1	6	61	11	61	645	3	22	26	30	6	3
Missouri	48	3	75	9	772	22		20	43	6	36	538	1	26	14	31	7	4
N. Ca'lina		15	51	3	591	28	1	9	42	3	39	601	2	9	22	4		
N. Dakota			17		223	15		2	13	7	5	121		7	2	1		2
S. Ca'lina	1	9	23	1	459	12		8	17		24	361		2	11	10	3	1
S. Dakota			35		437	24	1	4	54	8	14	316		4	5	14		
Utah		1	16	1	98	6		6	10	1	9	90	2	9	8	3		
W. Va.	3	3	31	3	303	14		4	35	4	29	268	3	14	18	5	2	1
Wisconsin	87	6	104	11	907	76	2	24	90	11	113	709	2	24	56	10	6	2
Totals	435	109	1257	152	9893	480	23	258	805	128	672	7640	65	251	369	222	83	56
Dela., '30			31	1	95	3			2	11	11	195	2	2	6	4	4	
Fla., '30	5		151	8	970	70	3	22	48	16	81	1756	6	62	58	34	22	6
Idaho, '30	1		24	2	175	15		17	29	15	19	273	2	12	6	4		
Ill., '30	49		776	41	3140	229	15	199	396	108	305	4260	42	137	161	171	98	57
Md., '30	3		65	4	653	42	1	23	31	22	75	918	3	33	32	20	3	3
Minn., '30	4		80	5	593	69		11	38	26	48	1181	1	36	24	41	11	5
Mo., '30	4		93	5	779	38		28	59	29	86	1045	5	37	22	29	6	5
N. C., '30	4		65	2	750	59		34	82	24	89	1387	10	17	33	9	4	1
N. D., '30			17		159	12		7	7	7	19	339		12	6	4	1	
S. C., '30			82	2	952	48		43	38	7	52	1423	3	11	27	20	5	1
S. D., '30	4		54		492	35	2	12	60	33	44	832	1	6	19	22		
Utah, '30	4		23	1	161	7	1	10	24	18	30	273	4	20	9	13	1	1
W. Va., '30	2		28	1	425	25		29	53	13	75	536	3	24	10	15	2	3
Wis., '30	6		176	7	1096	100	3	46	177	60	133	1558	7	66	52	45	11	6
Totals, '30	86	*	1670	79	10440	752	25	481	1044	389	1067	15976	89	475	465	431	168	88

*Not in production at that time.

Equipment - - - Development

Streamlining Automobiles Discussed Before Met. Section S. A. E.

NEW YORK, Feb. 19.—The streamlining of automobile bodies provided subject material for two very interesting papers which were presented before the Metropolitan Section of the Society of Automotive Engineers held at the A. W. A. Building, here, last evening.

Julio Andrade of the Murray Corporation of America and Othmar K. Marti of the American Brown Boveri Company were the principal speakers.

The subject was treated from two different points of view. Mr. Andrade's discussion was predicated on work done with models in the wind tunnel at the University of Detroit in the development of the new Reo bodies while Mr. Marti referred to experiments conducted on full sized cars as well as briefly to model tests.

Mr. Andrade pointed out that although there had been much work done in the field of aerodynamics no effort had been made to take advantage of this knowledge by its practical application to the design of automobile bodies. While cars have been built in Europe along aerodynamic lines, millions of cars in America have been built to the public taste with no regard to the reduction of air resistance. However, there is a place for serious consideration of streamline design; one possible approach to the introduction of the idea is the advantage it presents to the designer in creating novel designs.

That there is a decided improvement in possible performance was brought out in the wind-tunnel tests which were made on two scale models, one of the Murray design of Reo Royale compared with a Flying Cloud model. The results indicated that the streamline car would require 7.7 h. p. less than the conventional design at 80 m. p. h. This advantage, of course, is reduced at lower speeds. While the complete streamlining of the rear is out of the question, shapes can be improved by the adoption of lines which are more in conformity with aerodynamic principles. A possible outgrowth of the adoption of streamlines would be a 3-passenger front seat with a seat for two passengers at the rear.

Mr. Marti discussed some interesting results of comparative tests made with a conventional model Chrysler 72 and a similar car, which had mounted a body of streamline design by Paul Jaray. The streamlined car weighed approximately 300 pounds more than the conventional car. Coasting tests revealed that the streamline car under the same conditions coasted from 25 to 35 per cent. greater distance, had improved acceleration and resulted in an improvement of between 40 and 45 per cent. in fuel economy.

In addition to these advantages it was pointed out that others include better ventilation, increased floor space, greater safety due to the curved surfaces and improved visibility.

Both of the talks were illustrated with slides.

Austin M. Wolf, chairman of the Metropolitan section, presided.

A nominating committee for the selection of candidates for section officers for the next election was named. It will consist of A. C. Bergman, J. A. Anglada, Frederick Dutcher, J. J. Percival and Herbert Chase.

It was announced that the section members would have an opportunity to inspect the Empire State Building in April.

CLASSIFIED ADVERTISEMENTS IN THE AUTOMOTIVE DAILY NEWS BRING RESULTS

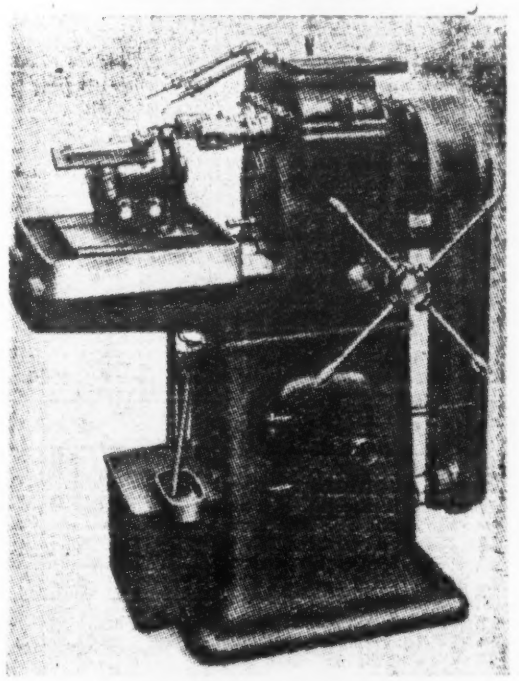
STRIPING DEVICE CAN BE USED IN ANY POSITION

The Wolverine Specialty Company, Detroit, Mich., has introduced a new, improved striping tool, known as the "Simplex." The tool, it is claimed, will stripe in any position or direction, and will not blot. Because of the adjustment provided for varying viscosities, it will handle lacquer or flat paint. It is also claimed that lacquer will not congeal in the device and may be disassembled easily for cleaning. A universal guide is furnished as standard equipment. The price is $15.

FEDERAL GAUGE DESIGNED FOR MAKING DIFFICULT MEASUREMENTS

Federal Products Corporation, Providence, R. I., has introduced a caliper gauge designed specifically for use in making difficult measurements. It has a range of three inches and a depth of four inches. The gauge is provided with a dial indicator. Special length jaws are available. The gauge weighs one and a quarter pounds.

Holes Drilled and Tapped With One Setting Of Machine



United Machine's 2-Spindle Horizontal Drilling and Tapping Machine

UNITED MACHINE TOOL COMPANY, New York city, has recently placed on the market two models of a horizontal drilling and tapping machine which permits holes to be drilled and tapped successively with only one setting of the work.

The larger model HBG-2 is illustrated. In addition to the smaller capacity and higher speeds, the smaller machine differs from the larger mainly in that the swinging work-holder is carried directly on a round bar which is adjustable horizontally by means of a hand wheel. Reverse motion of the tapping spindle is obtained by means of a coupling designed to eliminate tap breakage. All gears and shafts, as well as the reversing mechanism, run in oil. On the large machine three speeds are obtainable; for drilling they range from 400 to 866 revolutions per minute and for tapping from 134 to 290.

Either belt drive or direct motor drive, arranged as shown, can be furnished. Coolant equipment and a centering device are among the extras available.

Drilling and tapping capacity of the larger machine in steel, cast iron and brass is $\frac{5}{8}$, $\frac{3}{4}$ and 1 inch, respectively. The capacity of the smaller machine, the HBG-1, on the same materials is 5-16, $\frac{3}{8}$ and $\frac{1}{2}$ inch, respectively. For use on aluminum and light metal alloy, the smaller machine can be furnished with spindle speeds up to 5,600 revolutions per minute for drilling and 700 revolutions per minute for tapping. The distance from top of the table to center of spindles is $7\frac{7}{8}$ inches from center to center of the spindles is $4\frac{3}{4}$ inches, and the longitudinal traverse of the work-holder is 7 inches and 14 inches, respectively.

LARGE HORIZONTAL BORING MACHINE COMPLETED

THE Universal Boring Machine Company, Hudson, Mass., has recently completed a new horizontal boring machine, the largest built by the company.

Specifications of the machine, known as No. 50, are: Diameter of main boring bar, 5 inches; distance from face plate to outer support, 144 inches; distance from top of table to center of bar, 50 inches. The table measures 40 by 120 inches and has a power cross feed of 100 inches. The net weight of the machine, without motor, is 54,000 pounds.

CLASSIFIED ADVERTISEMENTS IN THE AUTOMOTIVE DAILY NEWS BRING RESULTS

REGISTRATION STATISTICS, JANUARY, 1931

Service, Springfield, Ill., and New Jersey, which are furnished by the New Jersey Motor List Co., New Car Division, Trenton, N. J. Readers section, may obtain these by addressing any of these three companies given here complete for the convenience of our subscribers

States	Marmon	Nash	Oakland	Oldsmobile	Packard	Peerless	Pierce-Arrow	Plymouth	Pontiac	Reo	Studebaker	Stutz	Viking	Whippet	Willys	Willys-Knight	Miscellaneous	Totals
Delaware		3	1	3	9		2	4	18						1			291
Florida	14	50	11	34	22		6	71	113	16	27	1	1	10	31	7		3,282
Idaho		6	6	3				21	10	3	16		1	8	16	2		568
Illinois	106	203	103	183	136	19	35	183	314	76	294	11	15	21	158	58	32	9,356
Maryland	3	27	7	18	10	5	3	25	59	8	31	1	1	6	21	2		1,609
Minnesota	8	41	21	26	31	2	1	68	67	16	54	1	1	15	72	11	1	2,361
Missouri	30	32	14	29	14	5	13	51	56	3	30			11	25	8	7	1,983
N. Ca'lina	2	9	3	31	3			36	65		16		1	10	19	1		1,616
N. Dakota	5	11	6	4				14	33	1	12		6	12	23	5		547
S. Ca'lina		2	5	8	1		1	13	20	1	13		1	1	4			1,012
S. Dakota	3	13	8	36	1			45	21	2	38		2	7	39	2		1,133
Utah	2	6	1	3			1	2	9	2	14	1		2	3			306
W. Va.	17	14	8	15	6			24	33	6	13	1	1	9	26	11		924
Wisconsin	21	106	39	97	13	3	14	48	105	13	94		3	8	67	16	5	2,892
Totals	211	523	233	490	246	34	76	605	923	147	652	16	33	120	505	123	45	27,880
Dela., '30		13	7	4	8			8	24	1	1			3	4		1	441
Fla., '30	10	51	24	25	36		8	53	57	7	21		2	21	24	8	7	3,672
Idaho, '30	2	25	7	12	3			18	19	1	16		1	7	7	3		715
Ill., '30	81	211	119	243	170	79	37	303	354	74	281	28	15	119	114	77	66	12,555
Md., '30	8	34	21	42	15	6	14	28	88	14	34	3	1	24	23	9	3	2,298
Minn., '30	4	37	26	36	34	5	9	62	46	5	51	2		39	32	14	6	2,581
Mo., '30	19	41	15	72	16	7	11	52	75	7	43		6	63	52	18	36	2,808
N. C., '30	9	26	14	32	10	1		37	60	4	16		1	31	22	4		2,837
N. D., '30	3	17	6	6	1			17	19	1	14		3	15	5	4		701
S. C., '30	11	27	12	29	8		1	42	54	7	23		1	16	7	3	1	2,956
S. D., '30	3	29	13	54	4			64	51	1	28		3	61	31	3		1,961
Utah, '30	7	14	3	11	4			3	13	4	9	1	3	1	7			690
W. Va., '30	12	37	12	26	10	2	3	24	41	10	21	1	1	16	24	7	2	1,493
Wis., '30	18	171	37	111	30	4	9	72	156	18	86	5	5	59	52	16	9	4,407
Totals, '30	187	733	316	703	349	104	92	783	1067	154	644	40	42	475	404	166	131	40,115

ROSS PISTON EXPANDER PRODUCTION UNDER WAY

Lansing, Mich., Feb. 19.—Manufacturing operations were well under way here today for the Ross Piston Expander Corporation, new Lansing firm, which entered the national automobile accessory field this week with granting of a corporation franchise by the secretary of state.

The new concern is putting out the Ross piston expander, a device which is declared to save 70 per cent. on motor overhauling expense by increasing the life of pistons. The expander is the invention of Ross N. Gibson, vice-president of the new corporation.

Manufacture of the piston expander is being carried out at the plant of the Michigan Screw Company here, although the firm has established separate general offices. Hugo B. Lundberg, president and general manager of Michigan Screw, is president of the new accessory company, and Glenn Sheren is secretary-treasurer. These two, with Gibson, Carl Reynolds, Glenn Pulver and F. H. McClintock, Packard and Auburn distributor here, constitute the board of directors.

WALTER K. TOWERS DIES; WAS WITH PAIGE-DETROIT

Detroit, Feb. 19.—Walter K. Towers, advertising manager of the Paige-Detroit Motor Car Company under the Jewett administration, is dead after an illness of several months. Mr. Towers, aged 43, following the Paige-Detroit connection, had been operating as an advertising counsel here. At one time he was managing editor of American Boy.

FACTORY SHIPMENTS OF AUBURN CARS INCREASE

Auburn, Ind., Feb. 19.—R. H. Faulkner, president of the Auburn Automobile Company, reported today that 3,371 Auburn and Cord cars had been shipped in the first forty-five days of 1931, compared with 2,343 in the period last year and 2,212 in 1929, the company's largest production year. He said Auburn had more than 7,000 unfilled orders on hand.

OVERMAN BRINGS PATENT SUIT AGAINST GOODYEAR

Cleveland, Feb. 19.—The Goodyear Tire and Rubber Company has been named defendant in a suit for over $500,000 filed in Federal District Court here by the Overman Cushion Tire Company of New York.

The suit alleges that Overman patents were infringed upon and asks for a temporary and permanent injunction restraining Goodyear from manufacturing or selling certain makes of tires.

U. S. RUBBER COMPANY SELLS PLANT IN NEW BRUNSWICK

New Brunswick, N. J., Feb. 19.—The last of the realty holdings of the United States Rubber Company in this city has been sold to Michael Jelin, who purchased the India Rubber plant of six buildings on Washington and Peace Streets. In addition to the six factory buildings a boiler house and engine room are included. The buildings were occupied for many years by the India Rubber Company, a subsidiary of the United States Rubber Company, but have been idle since 1923 when the company moved to Providence, R. I.

C. COWLES & CO. TAKES OVER ENGLISH & MERSICK

New Haven, Conn., Feb. 19.—The English & Mersick Company, maker of automobile hardware, has been taken over by C. Cowles & Co., engaged in the same line of manufacture. The English & Mersick Company, for many years one of the most prominent concerns in New Haven, was sold December 19 to a group of men headed by Frederick T. Bradley, its former president, and this group in turn accepted the offer of the Cowles company.

CLASSIFIED ADVERTISEMENTS IN THE AUTOMOTIVE DAILY NEWS BRING RESULTS

Major Specifications and Mechanical Details of 1931 Commercial Cars

Make and Model	Capacity—Tons or Lbs.	Chassis Price	Engine	No. of Cyls.	Bore and Stroke	Tax H. P.	Max. Brake H. P. at Specified R. P. M.	Oil System	Carburetor	Fuel Feed	Ignit. System	Gear Set	Location	No. Spds. For	Rear Axle	Final Drive	Reduction in Low	Brakes, Foot	Brakes, Hand	Standard Wheel Base	Chassis Weight	Tire Sizes: Front	Tire Sizes: Rear	Standard Tire Sizes
*Am. La France Chief	2	3650	Own	6	3¾x5	33.7	65@2100	Pw	Str	Vac	DR	Own	C	4	Tim	Wo	31.2	4	D	156	6200	32x6		32x6D
Am. La France W	3-4	3950	Own 2 R	4	4¼x6	28.9	42@1400	CS	Zen	Vac	AB	Own	C	4	Own	2R	47.4	4	R	160	7200	S36x5		S36x5D
*Am. La Fr. Chieft'n	3-4	5500	Own	6	4½x5½	40.8	75@1800	Pw	Zen	Vac	DR	Own	C	4	Tim	Wo	28.8	4	D	175	7200	S36x8		36x8D
Am. La France V	5	5500	Own 5 R	4	4¾x6	36.2	50@1200	CS	Zen	Vac	AB	Own	C	4	Own	Wo	54.4	4	R	165	9800	S36x5		S40x6D
Am. La Fr. Big Chief	6	6725	Own	6	4½x6	48.6	50@1200	Pw	Zen	Vac	DR	Own	C	4	Own	2R	32.8	4W	D	226	10600	S40x8		S40x8D
Am. La France U	7½	6000	Own 5 R	4	4¾x6	36.2	50@1200	CS	Zen	Vac	AB	Own	C	4	Own	—	63.5	4	R	165	10500	S36x7		S40x8D
Austin	—	475	Own	4	2.2x3	7.8	———	CS	Til	—	Aut	W-G	U	3	Sal	Sp	—	4	4	75	———	3 75x18		3.75x18
Autocar A	1½-2	3200	Own	6	4 x4¾	38.4	82@2400	Pw	Str	Vac	DR	Br-L 51	U	4	Own	Sp	27.9	4V	R	150	5060	34x7		34x7
Autocar D	2-2½	3500	Own	6	4 x4¾	38.4	82@2400	Pw	Str	Vac	DR	Br-L 51	U	4	Own	2R	33.5	4V	R	150	5300	34x7		34x7D
*Autocar SH	2½-3	4300	Own	6	4¼x4¾	43.4	92@2400	Pw	Str	Gra	DR	Own T	U	4	Own	2R	44.0	RV	R	114	6770	34x7		34x7D
Autocar SCH	2½-3	4300	Own	6	4¼x4¾	43.4	92@2400	Pw	Str	Vac	DR	Own T	U	4	Own	2R	44.0	RV	D	157	6860	34x7		34x7D
*Autocar H	3	4100	Own	4	4½x5½	32.4	45@1450	CS	Str	Gra	DR	Own T	U	4	Own	2R	48.6	RV	R	114	6770	34x7		34x7D
*Autocar HS	3½	4600	Own	4	4½x5½	32.4	45@1450	CS	Str	Gra	DR	Own T	U	4	Own	2R	54.3	RV	R	114	7900	40x8		40x8D
*Autocar SHS	3-3½	4800	Own	6	4¼x4¾	43.4	92@2400	Pw	Str	Gra	DR	Own T	U	4	Own	2R	54.3	RV	R	114	7900	40x8		40x8D
*Autocar SCHS	3-3½	4800	Own	6	4¼x4¾	43.4	92@2400	Pw	Str	Vac	DR	Own T	U	4	Own	2R	54.3	RV	D	157	8180	40x8		40x8D
Autocar TEA	3-3½	5350	Own	6	4¼x4¾	43.4	92@2400	Pw	Str	Vac	DR	Own T	U	12	Own	2R	101.1	4V	D	192	8900	36x8		36x8D
Autocar TFA	3½-5	6100	Own	6	4½x4¾	48.6	101@2400	Pw	Str	Vac	DR	Own T	U	12	Own	2R	101.3	4V	D	192	9300	38x9		38x9D
Autocar C	3½-5	5500	Own	6	4½x4¾	48.6	101@2400	Pw	Str	Vac	DR	Own B	C	4	Own	2R	61.7	RV	D	172	9500	42x9		42x9D
Autocar CG	5	8250	Own	6	4½x4¾	48.6	101@2400	Pw	Str	Vac	DR	Own B	C	12	Tim	Wo	120	WB	D	196	13000	36x8		36x8H
Autocar F	7½	6800	Own	6	4½x4¾	48.6	101@2400	Pw	Str	Vac	DR	Br-L 70	C	7	Tim	Wo	94.0	4V	D	173	11000	36x7S		40x8DS
Autocar G	10	9000	Own	6	4½x4¾	48.6	101@2400	Pw	Str	Vac	DR	Br-L 70	C	7	Tim	Wo	100	WB	D	171	13000	36x8		36x8D
Brockway 60	*6000	995	Con	6	3¾x4	27.3	61@3000	Pb	Zen	P	Aut	W-G	U	3	Col	Sp	19.8	4	Tr	132	3200	30x5		30x5
Brockway 65	6500	1195	Con	6	3¾x4⅝	27.3	65@2700	Pb	Zen	Vac	Aut	Br-L	U	3	Col	Sp	21.3	4	Tr	137	3400	30x5		30x5
Brockway 75	7500	1290	Con	6	3¾x4⅝	27.3	65@2700	Pb	Zen	Vac	Aut	Br-L	U	4	Col	Sp	25.6	4	Tr	137	3450	32x6		32x6
Brockway 90	9000	1525	Con	6	3¾x4⅝	27.3	65@2700	Pb	Zen	Vac	Aut	Br-L	U	4	Col	Sp	20.9	4	Tr	149	3650	32x6		32x6
Brockway 120	12000	1990	Con	6	4 x4⅛	38.4	73@2400	Pb	Zen	P	Aut	Br-L	U	4	Tim	Sp	31.3	4H	Tr	156	5200	32x6		32x6D
Brockway 140	14000	2495	Con	6	4 x4⅛	38.4	73@2400	Pb	Zen	P	Aut	Br-L	U	4	Wis	2R	35.3	4HV	D	156	5500	32x6		32x6D
Brockway 141	17000	2935	Con	6	4 x4⅛	38.4	73@2400	Pb	Zen	P	Aut	Br-L	U	4	Wis	2R	46.2	4HV	D	170	6200	32x6		32x6D
Brockway 170	17000	3180	Con	6	4⅛x4¾	40.8	89@2400	Pb	Zen	P	Aut	Br-L	U	4	Wis	2R	46.6	4HV	D	170	6800	32x6		32x6D
Brockway 175	17500	3660	Con	6	4⅜x4¾	45.9	100@2400	Pb	Zen	P	Aut	—	U	5	Wis	2R	45.3	4HV	D	170	7200	34x7		34x7D
Brockway 195	19500	3820	Con	6	4⅛x4¾	40.8	89@2400	Pb	Zen	P	Aut	Br-L	U	4	Wis	2R	49.5	4HV	D	170	7500	34x7		34x7D
Brockway 190	19000	4185	Con	6	4⅛x4¾	40.8	89@2400	Pb	Zen	P	Aut	Br-L	C	7	Tim	Wo	78.6	RV	D	168½	7625	34x7		34x7D
Brockway 220	22000	4560	Con	6	4⅜x4¾	45.9	100@2400	Pb	Zen	P	Aut	Br-L	U	4	Wis	2R	50.7	4HV	D	170	8200	36x8		36x8D
Brockway 250	25000	5950	Con	6	4⅜x4¾	45.9	100@2400	Pb	Zen	P	Aut	Br-L	U	4	Tim	Wo	63.7	4Hmv	D	182	10000	40x8		40x8D
Brockway 290	30000	7250	Con	6	4¾x5¾	54.15	116@1800	Pw	Str	P	L-N	Br-L	C	7	Tim	Wo	95.0	4W	D	182	10750	38x7P		40x14S
*Brockway 640	40000	9700	Con	6	4¾x5¾	54.15	116@1800	Pw	Str	P	L-N	Br-L	C	7	Tim	Wo	90.9	4W	D	212	14000	38x7P		36x10S
Chevrolet	½	355	Own	6	3⅛x3¾	26.3	50@2600	CS	Car	P	DR	Own	U	3	Own	Sp	13.61	4	R	109	1880	4.75x19		4.75x19
Chevrolet	1½	590	Own	6	3⅛x3¾	26.3	50@2600	CS	Car	P	DR	Own	U	4	Own	Sp	33.46	4	R	157	2890	30x5		30x5D
Chevrolet	1½	520	Own	6	3⅛x3¾	26.3	50@2600	CS	Car	P	DR	Own	U	4	Own	Sp	33.46	4	R	131	2560	30x5		32x6
Commerce Series S 11	1	1600	Bud H S 6	6	3⅜x4½	27.3	52@2200	Pb	Zen	Vac	Aut	Br-L	U	4	Col	Sp	25.5	4	D	142	3900	P30x5		P30x5
Commerce Series S 11	1½	1900	Bud H S 6	6	3⅜x4½	27.3	52@2200	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Sp	29.2	4	D	162	4300	P30x5		DP30x5
Commerce Series 40	1½	2990	Bud D S 6	6	3⅝x5	31.5	56@2000	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Wo	34.8	4	D	168	4500	P34x5		DP34x5
Commerce Series S 11	2	2030	Bud H S 6	6	3⅜x4½	27.3	52@2200	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Sp	29.2	4	D	162	4500	32x6P		32x6D
Commerce Series 40	2	3240	Bud D S 6	6	3⅝x5	31.5	56@2000	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Wo	34.8	4	D	168	4900	32x6		36x6D
Commerce Series 40	2½	3240	Bud D S 6	6	3⅝x5	31.5	56@2000	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Wo	34.8	4	D	168	5100	36x6P		36x6D
Commerce Series 60	2½	4580	Bud B A 6	6	4⅛x5⅛	40.8	83@2100	Pb	Zen	Vac	Aut	Ful	U	5	Tim	Wo	63.0	4	D	175	7000	36x6P		36x6D
Commerce Series 60	3	4680	Bud B A 6	6	4⅛x5⅛	40.8	83@2100	Pb	Zen	Vac	Aut	Ful	U	5	Tim	Wo	63.0	4	D	175	7100	36x6P		38x7D
Commerce Series 80	3½	5250	Bud B A 6	6	4⅛x5⅛	40.8	83@2100	Pb	Zen	Vac	Aut	Br-L	C	7	Tim	Wo	98.2	B	D	175	8200	36x6S		36x12S
Commerce Series 80	4	5330	Bud B A 6	6	4⅛x5⅛	40.8	83@2100	Pb	Zen	Vac	Aut	Br-L	C	7	Tim	Wo	98.2	B	D	175	8400	36x6S		36x14S
Commerce Series 100	5	5830	Bud B A 6	6	4⅛x5⅛	40.8	83@2100	Pb	Zen	Vac	Aut	Br-L	C	7	Tim	Wo	95.0	B	D	175	9600	36x6S		40x14S
Day Elder 60	1	1195	Con 25 A	6	3¾x4	27.3	61@3000	Pw	Zen	P	DR	W-G	U	4	Tim	Sp	36.3	4	4	135	3200	20x6.00B		20x6.50B
Day Elder 85	1½	1645	Con 16 C	6	3¾x4⅝	27.3	65@2700	Pw	Zen	P	DR	W-G	U	4	Tim	Sp	42.3	4	4	135	3750	20x6.00B		20x6.50DB
Day Elder 110	2	2095	Con 16 C	6	3⅞x4⅝	27.3	65@2700	Pw	Zen	P	DR	Br-L	U	4	Tim	Sp	44.9	4	D	156	4600	20x7.00B		20x7.00DB
Day Elder 130	2½	2895	Con 16 R	6	4 x4⅛	38.4	75@2400	Pw	Zen	P	DR	Br-L	U	4	Tim	Sp	40.7	4	D	150	6400	20x7.50B		20x9 00DB
Day Elder 160	3	3695	Con 18 R	6	4 x4½	38.4	82@2400	Pw	Zen	P	DR	Br-L	U	4	Tim	Wo	36.1	4	D	156	6600	20x7.50B		20x9.00DB
Day Elder 200	4	4295	Con 18 R	6	4 x4½	38.4	82@2400	Pw	Zen	P	DR	Br-L	U	4	Tim	Wo	43.5	4	D	156	7400	20x9.00B		20x9.00B
Day Elder 240	5	5500	Con 21 R	6	4⅜x4¾	45.9	100@2600	Pw	Zen	P	DR	Br-L	C	4	Tim	Wo	50.8	4	D	162	9300	38x9P		38x9DP
Day Elder 285	8	6000	Con 21 R	6	4⅜x4¾	45.9	100@2600	Pw	Zen	Vac	DR	Br-L	C	7	Tim	Wo	71.2	6	D	164	12000	20x8.25DB		20x8.25DB
Day Elder 345	10	7500	Con 21 R	6	4⅜x4¾	45.9	100@2600	Pw	Zen	Vac	DR	Br-L	C	7	Tim	Wo	79.9	4	D	164	12500	20x9.00B		20x9.00DB
Day Elder 402	12	9000	Con 16 H	6	4¾x5¾	54.2	127@2300	Pw	Zen	Vac	DR	Br-L	C	7	Tim	Wo	84.8	4	D	164	14000	20x9 75B		20x9.75DB
Diamond T 290	1	675	Buda H 199	4	3¾x4½	22.5	57@3000	Pw	Zen	P	Aut	W-G	U	4	Cla	Sp	—	4H	B	128½	3050	P30x5		P30x5
Diamond T 216	1	695	Her JXA	6	3⅜x4¼	27.3		Pb	Zen	P	Aut	W-G	U	4	Cla	Sp	—	4H	B	135⅛	3300	20x6.50B		20x6.50B
Diamond T 291	1½	1475	Her WXA 2	6	3½x4½	29.4	58@2400	Pb	Zen	P	Aut	Cov	U	4	Cla	Sp	—	4H	D	156¼	4400	20x6.50B		20x6.50DB
Diamond T 303	2	1745	Her WXB	6	3¾x4½	33.7	66@2400	Pb	Zen	P	Aut	Cov	U	4	Cla	Sp	—	4HV	D	159¾	5000	20x7.00B		20x7.00DB
Diamond T 551	2½	2250	Her WXC	6	4 x4½	38.4	75@2400	Pb	Zen	P	Aut	Cov	U	4	Tim	Sp	—	4HV	D	168	5600	20x7.50B		20x7.50DB
Diamond T 504	2½	2675	Her WXC	6	4 x4½	38.4	75@2400	Pb	Zen	P	Aut	Cov	U	4	Wisc	2R	—	4HV	D	176½	6400	20x8.25B		20x8.25DB
Diamond T 506	2½	3000	Her WXC 3	6	4¼x4½	43.3	84@2200	Pb	Zen	P	Aut	Cov	U	5	Wisc	2R	—	4HV	D	174	6400	20x8.25B		20x8.25DB
Diamond T 603	3	3300	Her YXC	6	4¾x4¾	45.9	94@2200	Pb	Zen	P	Aut	Cov	U	5	Wisc	2R	—	4HV	D	169	7500	20x9.00B		20x9.00DB
Diamond T 606	3	3440	Her YXC 2	6	4½x4¾	48.6	98@2200	Pb	Zen	P	Aut	Cov	U	5	Wisc	2R	—	4HV	D	187½	7500	20x9.00B		20x9.00DB
Diamond T 750	4	4800	Her YXC 4	6	4⅝x5¼	51.3	———	Pb	Zen	P	Aut	Cov	C	5	Wisc	2R	—	4W	D	178	8300	22x9.75B		22x9.75DB
*Diamond T 801	4	4140	Her YXC	6	4¾x4¾	45.9	94@2200	Pb	Zen	P	Aut	Br-L	C	7	Own	Wo	—	6HV	D	183½	8300	36x8P		4P 36x8
*Diamond T 1200	6	5600	Her YXC 2	6	4½x4¾	48.6	98@2200	Pb	Zen	P	Aut	Br-L	C	7	Tim	Wo	—	4RW	D	180	11000	34x7P		4wh 34x7D
*Diamond T 1600	8	6220	Her YXC 3	6	4¾x4¾	51.3	106@2200	Pb	Zen	P	Aut	Br-L	C	7	Tim	Wo	—	4RW	D	190	11700	36x8P		4wh 36x8D
*Diamond T 1601	8	7500	Wak 6RB	6	5 x5¾	60.0	126@1800	Pb	Zen	P	Aut	Br-L	C	7	Tim	Wo	—	4RW	D	194	12500	36x8P		4wh 36x8D
Dodge Bros. UF10	½	435	Own	4	3⅜x4¾	21.2	48@2800	Pb	Car	P	DR	Own	U	3	Own	Sp	14.28	4	D	109	1925	5.00x19		5.00x19
Dodge Bros F10	½	515	Own	6	3⅛x4⅛	23.4	61@3400	Pb	Car	P	DR	Own	U	3	Own	Sp	14.28	4	D	109	1975	5.25x19		5.25x19
Dodge Bros. U1	¾	695	Own	4	3⅜x4¼	21.3	45@2800	Pb	Car	Vac	NE	Own	U	3	Own	Sp	21.68	4	D	124	2260	5.50x20B		5.50x20B
Dodge Bros. DA1	¾	795	Own	6	3⅜x3⅞	27.3	63@3200	Pb	Zen	Vac	NE	Own	U	4	Own	Sp	36.83	4	D	124	2360	5.50x20		5.50x20
Dodge	1	795	Own	4	3⅜x4¼	21.0	45@2300	P	Car	Vac	NE	Own	—	3	Own	Sp	36.13	H	—	133	2590	6.00x20		32x6
Dodge	1	895	Own	6	3⅜x3⅞	27.3	63@3200	P	Zen	Vac	NE	Own	—	3	Own	Sp	33.45	H	—	133	2690	6.00x20		32x6
Dodge Bros. UF30	1½	595	Own	4	3⅜x4⅜	21.0	48@2800	Pb	Car	P	DR	Own	U	4	Own	Sp	37.17	4	D	136	2581	6.00x20		32x6
Dodge Bros. F30	1½	695	Own	6	3⅛x4⅛	23.4	61@3400	Pb	Car	P	DR	Own	U	4	Own	Sp	37.17	4	D	136	2631	6.00x20		32x6
Dodge Bros. F35	1½	1425	Own	6	3⅜x3⅞	27.3	63@3200	Pb	Zen	P	DR	Own	U	4	Own	Sp	41.43	4	D	140	3780	6.00x20		6.00x20D
Dodge Bros. F36	1½	1485	Own	6	3⅜x3⅞	27.3	63@3200	Pb	Zen	P	DR	Own	U	4	Own	Sp	41.43	4	D	165	3972	6.00x20		6.00x20D
*Dodge Bros. F40	2	1995	Own	6	3⅝x5	31.5	96@3000	Pb	Zen	P	DR	Own	U	4	Own	Sp	43.73	4	D	150	5173	6.50x20		6.50x20D
*Dodge Bros. F41	2	2085	Own	6	3⅝x5	31.5	96@3000	Pb	Zen	P	DR	Own	U	4	Own	Sp	43.75	4	D	165	5211	6.50x20		6.50x20D
Dodge	3	1845	Own	6	3⅜x4½	27.3	78@3000	P	Zen	Vac	NE	Own	—	4	Own	Sp	46.31	H	—	135	4235	32x6		32x6D
Dodge	3	1895	Own	6	3⅜x4½	27.3	78@3000	P	Zen	Vac	NE	Own	—	4	Own	Sp	41.43	H	—	165	4520	32x6		32x6D
Dodge	3	1945	Own	6	3⅜x4½	27.3	78@3000	P	Zen	Vac	NE	Own	—	4	Own	Sp	46.31	H	—	185	4715	32x6		32x6D
Dodge Bros. F60	3	2645	Own	6	3⅝x5	31.5	96@3000	Pb	Zen	P	DR	Own	U	4	Own	Sp	48.87	4	D	146	5543	32x6		32x6D
*Dodge Bros. F61	3	2575	Own	6	3⅝x5	31.5	96@3000	Pb	Zen	P	DR	Own	U	4	Own	Sp	48.87	4	D	170	5789	32x6		32x6D
*Dodge Bros. F62	3	2695	Own	6	3⅝x5	31.5	96@3000	Pb	Zen	P	DR	Own	U	4	Own	Sp	48.87	4	D	195	5901	32x6		32x6D
Essex Commercial	¾	445	Own	6	2¾x4½	18.2	———	CS	Mar	Vac	Aut	Own	U	3	Own	Sp	17.8	4	4	110	2150	30x5		31x5.50
Federal D	1½	830	Con W 10	4	3¾x4¼	24.0	48@2500	Pb	Zen	P	DR	W-G T9	U	4	Cla	Sp	40.8	4	Tr	131	3185	6.00x20		32x6
Federal E6	1½	1090	Con 17 E	6	3¾x4	27.3	60@2600	Pb	Zen	Vac	DR	W-G T9	U	4	Cla	Sp	34.6	4	Tr	132	3260	6.00x20		32x6
Federal F7	1½	1525	Con 18 C	6	3⅜x4⅝	27.3	64@2500	Pb	Zen	P	DR	Own	U	4	Tim	Sp	24.3	4	Tr	132	3765	30x5		30x5D
Federal A6	2	1855	Con 18 C	6	3⅜x4⅝	27.3	64@2500	Pb	Zen	Vac	DR	Own	C	4	Cla	Sp	38.5	4	Tr	151	4580	32x6		32x6D
Federal A6T	2½	2185	Con 18 C	6	3⅜x4⅝	27.3	64@2500	Pb	Zen	Vac	DR	Own	C	4	Tim	Sp	41.3	4	Tr	151	4950	32x6		32x6D
Federal A6TW	2½	2360	Con 18 C	6	3⅜x4⅝	27.3	64@2500	Pb	Zen	Vac	DR	Own	C	4	Tim	Wo	42.0	4	Tr	151	4950	32x6		32x6D
Federal T10B	2½-3	2740	Con 16 R	6	4 x4⅛	38.4	75@2200	Pb	Zen	P	DR	Own	C	4	Tim	Sp	36.3	4	Tr	165	6550	34x7		34x7D
Federal T10W	2½-3	2915	Con 16 R	6	4 x4⅛	38.4	75@2200	Pb	Zen	P	DR	Own	C	4	Tim	Wo	44.0	4	Tr	165	6550	34x7		34x7D
Federal U6	3-3½	3860	Con 18 R	6	4 x4½	38.4	85@2200	Pb	Str	P	DR	Br-L 55	C	7	Tim	Wo	64.6	4	D	165	7220	34x7		34x7D
Federal 4C6A	4-5	4735	Con 20 R	6	4⅛x4¾	40.8	90@2200	Pb	Zen	P	DR	Br-L 55	C	7	Tim	Wo	73.6	4	D	192	8330	36x8		36x8D
Federal 4C6AB	4-5	4960	Con 20 R	6	4⅛x4¾	40.8	90@2200	Pb	Zen	P	DR	Br-L 55	C	7	Tim	Wo	73.6	4	D	192	8850	36x8		36x8D
*Federal U6SW	6	6000	Con 20 R	6	4⅛x4¾	40.8	90@2200	Pb	Zen	P	DR	Br-L 55	C	7	Tim	Wo	71.3	6	Tr	201	9850	34x7		34x7D
*Federal U6SWAB	6	6500	Con 20 R	6	4⅛x4¾	40.8	90@2200	Pb	Zen	P	DR	Br-L 55	C	7	Tim	Wo	71.3	6	Tr	201	9900	34x7		34x7D
Federal X8	7½	5085	Con B 7	4	5 x6	40.0	61@1350	Pw	Zen	Vac	AB	Br-L 60	C	7	Tim	Wo	110.9	R	D	162	9750	36x6S		40x14S
Federal X8R	7½	5810	Con 21 R	6	4⅜x4¾	45.9	100@2200	Pb	Zen	P	DR	Br-L 60	C	7	Tim	Wo	110.9	R	D	162	10000	40x8		40x8D
*Federal 4C6SW	8	7500	Con 21 R	6	4⅜x4¾	45.9	100@2200	Pb	Zen	P	DR	Br-L 55	C	7	Tim	Wo	80.8	6	Tr	231	11500	36x8		36x8D
Ford AA	1½	495	Own	4	3⅞x4¼	24.0	40@2200	Sp	Zen	Gra	Own	Own	U	4	Own	St	42.24	4	R	131½	2724	6.00x20		32x6
Ford AA	1½	525	Own	4	3⅞x4¼	24.0	40@2300	Sp	Zen	Gra	Own	Own	U	4	Own	St	42.24	4	R	157	2811	6.00x20		6.00x20
F W D—H	1½	3300	Wis S U	4	4 x5	25.6	50@2000	Pb	Zen	Vac	Eis	Cotta	C	4	Own	St	38.1	4	R	121	5300	34x7		34x7
F W D—H6	2	3425	Wak	6	3¾x4½	29.4	72@2500	Pb	Zen	Vac	Eis	Br-L	U	4	Own	St	35.0	4	R	133	5500	34x7		34x7
F W D—BTL	2	3900	Wak	6	3¾x4¾	33.7	72@2500	Pb	Zen	Vac	Eis	Br-L	C	7	Own	St	84.7	4	R	137½	6000	36x8		36x8
F W D—HH6	2½	4000	Wak	6	3¾x4¾	33.7	72@2500	Pb	Zen	P	Eis	Br-L	C	7	Own	St	101.0	4	R	138	6400	36x8		36x8
F W D—R	3	4200	Own	4	4¾x5½	36.1	58@1350	Pb	Str	Gra	Eis	Own	C	3	Own	St	35.6	4	R	124	6460	36x6S		36x6S
F W D—BT	3-3½	4742	Wak	6	4⅛x5⅛	40.8	92@2300	Pb	Zen	Vac	Eis	Own	C	5	Own	St	101.0	4	R	137¾	7700	40x7S		40x5SD
F W D—CU6	3½	5120	Wak	6	4⅛x5⅛	40.8	92@2300	Pb	Zen	Vac	Eis	Own	C	5	Own	St	88.6	4	R	148	7200	36x6S		36x8S
F W D—SSU	4	5220	Wak	6	4⅜x5⅛	45.9	102@2200	Pb	Zen	Vac	Eis	Own	C	5	Own	St	88.6	4	R	148	7600	38x9		38x9
F W D—M5	5	7600	Wak	6	4⅜x5⅛	45.9	102@2200	P	Zen	P	Aut	Br-L	U	8	Wis	2R	193.1	4V	D	165	11000

Major Specifications and Mechanical Details of 1931 Commercial Cars

Make and Model	Capacity—Tons or Lbs.	Chassis Price	Engine	No. of Cyls.	Bore and Stroke	Tax H. P.	Max. Brake H. P. at Specified R. P. M.	Oil System	Carburetor	Fuel Feed	Ignit. System	Gear Set	Location	No. Spds. For.	Rear Axle	Final Drive	Reduction in Low	Brakes, Foot	Brakes, Hand	Standard Wheel Base	Chassis Weight	Standard Tire Sizes Front	Rear
Gramm BX-6	1½	995	Con 25 A	6	3⅜x4	27.3	61@3000	Pb	Til	P	Aut	W-G	U	4	Tim	Sp	36.3	4	D	131	3100	6.00x20	6.00x20D
*Gramm B	1¾	1495	Lyc 4 SL	6	3¼x4½	25.3	61@2900	Pb	Zen	Vac	Aut	Cov	U	4	Tim	Sp	34.3	4	D	140	3800	6.50x20	6.50x20D
*Gramm C	2	1795	Lyc ASA	6	3⅜x4½	31.54	82@2600	Pb	Zen	P	Aut	Cov	U	4	Tim	Sp	31	4	D	160	4820	7.00x20	7.00x20D
†Gramm CX	2	1095	Con W-11	4	4½x4¼	27.2	55@2600	Pb	Til	P	Aut	W-G	U	4	Tim	Sp	37	4	D	131	3300	6.50x20	6.50x20L
Gramm CX	2	1295	Con 16 C	6	3⅜x4⅜	27.3	70@3000	Pb	Til	P	Aut	W-G	U	4	Tim	Sp	37	4	D	131	3300	6.50x20	6.50x20D
*Gramm D	2½	1995	Lyc ASD	6	3¾x4½	33.7	90@2200	Pb	Zen	P	Aut	Cov	U	4	Tim	Sp	33	4	D	160	5100	7.50x20	7.50x20D
*Gramm E	3	2595	Lyc TS	6	3⅞x5	36	90@2200	Pb	Zen	P	Aut	Cov	U	4	Tim	Sp	35	4	D	160	5500	8.25x20	8.25x20D
*Gramm EY	3	3595	Con 20 R	6	4⅛x4¾	40.80	90@2200	Pb	Zen	P	Aut	Cov	U	4	Tim	Sp	30	4	D	190	6750	7.50x20	7.50x20D
*Gramm T-38	3	3595	Lyc TS	6	3⅞x5	36	90@2200	Pb	Zen	P	Aut	Ful	U	4	Wis	2R	45	D	R	153	7200	36x8S	36x10S
*Gramm O-45	4	3995	Lyc TS	6	3⅞x5	36	85@2200	Pb	Zen	P	Aut	Ful	C	8	Wis	2R	75.8	D	R	153	7700	36x8S	36x12S
*Gramm GY	4	4345	Con 21 R	6	4⅜x4¾	45.9	100@2200	Pb	Zen	P	Aut	Cov	U	4	Wis	2R	28	4	D	210	7200	8.25x20	8.25x20D
Gramm GW	4	5175	Con 21 R	6	4⅜x4¾	45.9	100@2200	Pb	Zen	P	Aut	Cov	U	4	Wis	2R	—	4W	D	157	8900	9.00x20	9.00x20D
*Gramm O-60	5	4745	Lyc TS	6	3⅞x5	36	—	Pb	Zen	P	Aut	Ful	C	8	Wis	2R	78.4	D	R	153	8800	36x6S	36x14S
*Gramm HY	5	6545	Con 16 H	6	4¾x5⅝	54.15	127@2300	Pb	Zen	P	Aut	Ful	U	4	Wis	2R	25.2	4	D	236	9600	36x8	36x8D
Indiana 60	*6000	995	Con	6	3⅜x4	27.3	61@3000	Pb	Str	P	Aut	W-G	U	3	Col	Sp	19.8	4	Tf	132	3200	30x5	30x5
Indiana 64	6500	1195	Con	6	3⅜x4⅝	27.3	65@2700	Pb	Str	Vac	Aut	Br-L	U	3	Col	Sp	21.3	4	Tr	137	3400	30x5	30x3
Indiana 74	7500	1290	Con	6	3⅜x4⅝	27.3	65@2700	Pb	Str	Vac	Aut	Br-L	U	4	Col	Sp	25.6	4	Tr	137	3450	32x6	32x6
Indiana 89	9000	1525	Con	6	3⅜x4⅝	27.3	65@2700	Pb	Str	Vac	Aut	Br-L	U	4	Col	Sp	20.9	4	Tr	149	3650	32x6	32x6
Indiana 111 X W	12500	1850	Her	4	4 x5	25.6	46@2000	Fb	Str	Vac	Eis	Br-L	U	4	Wis	2R	35.2	R	Tr	120	3740	32x6	32x6D
Indiana 120	12000	1990	Con	6	4 x4⅛	38.4	73@2400	Pb	Str	P	Aut	Br-L	U	4	Tim	Sp	31.3	4H	Tr	156	5200	32x6	32x6L
Indiana 140	14000	2495	Con	6	4 x4⅛	38.4	73@2400	Pb	Str	P	Aut	Br-L	U	4	Wis	2R	35.3	4HV	D	156	5500	32x6	32x6D
Indiana 141	17000	2935	Con	6	4 x4⅛	38.4	73@2400	Pb	Str	P	Aut	Br-L	U	4	Wis	2R	46.2	4HV	D	170	6200	32x6	32x6L
Indiana 170	17000	3160	Con	6	4⅛x4¾	40.8	89@2400	Pb	Str	P	Aut	Br-L	U	4	Wis	2R	46.6	4HV	D	170	6800	32x6	32x6D
Indiana 175	17500	3660	Con	6	4⅛x4¾	45.9	100@2400	Pb	Str	P	Aut	—	U	5	Wis	2R	45.3	4HV	D	170	7200	34x7	34x7D
Indiana 195	19500	3820	Con	6	4⅛x4¾	40.8	89@2400	Pb	Str	P	Aut	Br-L	U	4	Wis	2R	49.8	4HV	D	170	7500	34x7	34x7D
Indiana 190	19000	4185	Con	6	4⅛x4¾	40.8	89@2400	Pb	Str	P	Aut	Br-L	C	7	Tim	Wo	78.6	RV	D	168½	7625	34x7	34x7D
Indiana 220	22500	4560	Con	6	4⅜x4¾	45.9	100@2400	Pb	Str	P	Aut	Br-L	U	4	Wis	2R	50.7	4HV	D	170	8200	36x8	36x8D
Indiana 250	25000	5950	Con	6	4⅜x4¾	45.9	100@2400	Pb	Str	P	Aut	Br-L	U	4	Tim	Wo	63.7	4HMV	D	182	10000	40x8	40x8D
Indiana 290	30000	7250	Con	6	4¾x5¾	54.1	116@1800	Pw	Str	P	L-N	Br-L	C	7	Tim	Wo	95.0	4W	D	182	10750	38x7P	40x14S
*Indiana 640	40000	9700	Con	6	4¾x5¾	54.1	116@1800	Pw	Str	P	L-N	Br-L	C	7	Tim	Wo	90.9	4W	D	212	14000	38x7P	36x10S
International AW1	¾	720	Wak X A	4	3½x4½	19.6	30@2700	Pb	Zen	Vac	DR	Mec	U	3	Own	Sp	17.4	4	2	136	2620	5.25x20	5.25x20
Internat'n'l Sp. Del.	¾	720	Wak X A	4	3½x4½	19.6	30@2700	Pb	Zen	Vac	DR	Mec	U	3	Eat	Sp	60.3	4	2	124	2200	5.25x30	5.25x30
Intern'l 6 Spd. Spec.	1	820	Wak X A	4	3½x4½	19.6	30@2700	Pb	Zen	Vac	DR	Mec	U	3	Eat	Sp	52.6	4	2	124	2430	30x5	30x5
International S24	1¼	1160	Lyc C T	4	3⅜x5	22.5	43@2350	Pw	Zen	Vac	DR	Own	U	3	Eat	Sp	21.3	4	2	130	3200	30x5	30x5
International S26	1¼	1310	Lyc 4 S L	6	3¼x4½	25.3	61@2800	Pb	Zen	Vac	DR	Own	U	3	Eat	Sp	21.3	4	2	130	3250	30x5	30x5
International AW2	1½	820	Wak X A	4	3½x4½	19.6	30@2700	Pb	Zen	Vac	DR	Mec	U	3	Own	Sp	60.3	4	2	136	2980	5.50x20	6.00x20
International SF34	1½	1450	Lyc C T	4	3⅜x5	22.1	43@2350	Pw	Zen	Vac	DR	Own	U	3	Eat	Sp	22.6	4	2	140	3520	30x5	32x6
International AL3	1½	1450	Lyc SLH	6	3¼x4½	25.3	61@2800	Pb	Zen	Vac	DR	W-G	U	4	Own	Sp	42.9	4	2	138	4300	6.00x20	6.00x20L
International SF36	1¼	1606	Lyc 4 S L	6	3¼x4½	25.3	61@2800	Pb	Zen	Vac	DR	Own	U	3	Eat	Sp	22.6	4	2	140	3570	30x5	32x6
International SD44	2	1590	Lyc C T	4	3⅜x5	22.5	43@2350	Pw	Zen	Vac	AB	Own	U	4	Eat	Sp	40.6	4	2	117	3700	30x5	32x6
International SD46	2	1740	Lyc 4 S L	6	3¼x4½	25.3	61@2800	Pb	Zen	Vac	AB	Own	U	4	Eat	Sp	40.6	4	2	117	3750	30x5	32x6
International SF46	2	1950	Lyc 4 S L	6	3¼x4½	25.3	61@2800	Pb	Zen	Vac	DR	Own	U	4	Eat	Sp	40.6	4	2	140	4000	32x6	32x6D
International A4	2	1985	Own F B B	6	3⅝x4½	31.5	65@2800	Pb	Zen	Vac	DR	Own	U	5	Own	Sp	47.8	4	2	145	5070	32x6	32x6D
International HS54	2½	3850	Hall-S 151	4	4¼x5½	28.9	54@1800	Pb	Zen	Vac	RB	Own	U	5	Eat	2R	60.5	4	4	148	8000	36x5S	36x8S
International HS54C	2½	3850	Hall-S 151	4	4¼x5½	28.9	54@1800	Pb	Zen	Vac	RB	Own	U	5	Own	Ch	63.8	4	4	148	8665	36x5S	36x10S
International W1	2½	3850	Hall-S 151	4	4¼x5½	28.9	54@1800	Pb	Zen	Vac	RB	Own	U	5	Own	2R	60.5	4	2	148	8300	36x5S	36x8S
International A5	3	2550	Own F B B	6	3⅝x4½	31.5	65@2800	Pb	Zen	Vac	DR	Own	U	5	Own	Sp	52.6	4	2	156	5606	34x7	34x7D
International A6	3	2675	Own B B	6	3⅝x4½	31.5	65@2800	Pb	Zen	Vac	DR	Own	U	5	Own	Sp	62.5	4	2	156	5750	34x7	34x7D
International HS74	3½	4850	Hall-S 152	4	4¾x5½	36.1	60@1800	Pb	Zen	Vac	RB	Own	U	5	Eat	2R	70.5	4	4	160	10700	36x5S	40x12S
International HS74C	3½	4850	Hall-S 152	4	4¾x5½	36.1	60@1800	Pb	Zen	Vac	RB	Own	U	5	Own	Ch	79.1	4	4	160	11000	36x6S	40x12S
International W3	3½	4850	Hall-S 152	4	4¾x5½	36.1	60@1800	Pb	Zen	Vac	RB	Own	U	5	Own	2R	70.5	4	2	160	10123	36x6S	40x12S
Internat'n'l HS104C	5	5500	Hall-S 152	4	4¾x5½	36.1	60@1800	Pb	Zen	Vac	RB	Own	U	5	Own	Ch	90.5	4	4	160	11093	36x6S	40x14S
La France-Rep. A1	6000	795	Lyc	6	3 x4¾	21.5	60@2500	Pb	Zen	Vac	Aut	Ful	U	4	Tim	Sp	36.1	4	Tr	132	3000	5.50x20	32x6
La France-Rep. C1	7500	1295	Lyc	6	3¼x4½	25.4	61@2750	Pb	Zen	Vac	Aut	Ful	U	4	Tim	Sp	29.1	4	Tr	144	3300	6.00x20	32x6
La France-Rep. D1	9000	1595	Lyc	6	3¼x4½	25.4	61@2750	Pb	Zen	Vac	Aut	Ful	U	4	Tim	Sp	37.9	4	Tr	144	3725	30x5	30x5D
La France-Rep F2	13000	2395	Lyc	6	3⅝x5	31.5	83@2800	Pb	Zen	Vac	Aut	Ful	U	4	Tim	Sp	40.1	4	D	174	5400	32x6	32x6D
La France-Rep. H2	15000	2985	Lyc	6	3⅞x5	36.0	85@2500	Pb	Zen	Vac	Aut	Ful	U	4	Tim	Sp	44.5	4	D	174	5850	34x7	34x7D
La France-Rep. 35-2	24000	5600	Wak	6	4½x5¾	48.6	98@1850	Pb	Zen	Vac	Aut	Ful	U	4	Wis	2R	45.4	4	D	174	8200	38x9	38x9D
La France-Rep. M2	20000	4000	Wak	6	4⅜x5½	46.0	97@2000	Pb	Zen	Vac	Aut	Ful	U	5	Wis	2R	62.3	4	D	174	6900	36x8	36x8D
Mack BL	1	2566	Own	6	3¼x5	25.39	63@2800	Pw	Str	Vac	NE	Own	U	4	Own	Sp	Opt	4	D	148	——	B6.00x20	DB6.00x20
††Mack BG	1½	3000	Own	6	3⅝x5	31.57	75@2600	Pw	Str	Vac	NE	Own	U	4	Own	Sp	Opt	4	D	156	——	32x6	D32x6
Mack AB	2½-3	3950	Own	6	4¼x5	28.9	60@2200	Pb	Str	Gra	RB	Own	U	4	Own	2R	Opt	R	D	2-Opt	——	36x8S	36x8S
††Mack AB	2½-3	3500	Own	6	4¼x5	28.9	60@2200	Pb	Str	Gra	RB	Own	U	4	Own	Ch	Opt	R	D	2-Opt	——	36x8S	36x8S
Mack AB	2½-3	4750	Own	6	3⅝x5	31.57	75@2600	Pw	Str	Vac	NE	Own	U	4	Own	2R	Opt	R	D	2-Opt	——	34x7	D34x7
††Mack AB	2½-3	4300	Own	6	3⅝x5	31.57	75@2600	Pw	Str	Vac	NE	Own	U	4	Own	Ch	Opt	R	D	2-Opt	——	34x7	D34x7
††Mack B	3-4	5250	Own	6	4 x5½	38.4	100@2300	Pb	Str	Vac	NE	Own	U	4	Own	2R	Opt	4	D	2-Opt	——	36x8	D36x8
††Mack BC	3½-5	5500	Own	6	4 x5½	38.4	100@2300	Pb	Str	Vac	NE	Own	U	4	Own	Ch	Opt	4	D	2-Opt	——	36x8	36x8D
††Mack BJ	3½-5	6150	Own	6	4½x5½	48.6	126@2200	Pb	Str	Vac	L-N	Own	C	4	Own	2R	Opt	4	D	3-Opt	——	36x8	36x8D
††Mack AK	3½-5	5150	Own	4	5 x6	40.0	77@1800	Pb	Str	Gra	RB	Own	J	4	Own	Ch	Opt	4	J	3-Opt	——	36x5S	36x5DS
††Mack AK	3½-5	5250	Own	4	5 x6	40.0	77@1800	Pb	Str	Gra	RB	Own	C	4	Own	2R	Opt	4	D	3-Opt	——	36x5S	36x5DS
††Mack AC	3½-5	4950	Own	4	5 x6	40.0	77@1800	Pb	Str	Gra	RB	Own	J	4	Own	Ch	Opt	J	R	3-Opt	——	36x5S	40x10S
††Mack AK	3½-5	6450	Own	6	4½x5½	48.6	126@2200	Pb	Str	Vac	L-N	Own	C	4	Own	2R	Opt	4	D	3 Opt	——	10.50x22B	10.50x22DB
††Mack AC	5½-7	5500	Own	4	5 x6	40.0	77@1800	Pb	Str	Gra	RB	Own	J	4	Own	Ch	Opt	J	R	3-Opt	——	36x6S	40x12S
††Mack AC	5½-7	6550	Own	6	4½x5½	48.6	126@2200	Pb	Str	Vac	L-N	Own	J	4	Own	Ch	Opt	4	J	3 Opt	——	10.50x24B	10.50x24DB
††Mack AC	7½	6000	Own	4	5 x6	40.0	77@1800	Pb	Str	Gra	RB	Own	J	4	Own	Ch	Opt	J	R	3-Opt	——	36x7S	40x14S
††Mack AP	7½	9500	Own	6	5 x6	60.0	150@2000	Pb	Str	Gra	NE	Own	J	4	Own	Ch	Opt	R	J	191	——	36x7S	40x8DS
††Mack AC 6-wheel	10	7500	Own	4	5 x6	40.0	77@1800	Pb	Str	Gra	RB	Own	J	4	Own	Ch	Opt	4R	J	3-Opt	——	36x7S	40x12S
††Mack AP 6-wheel	10	12000	Own	6	5 x6	60.0	150@2000	Pb	Str	Gra	NE	Own	J	4	Own	Ch	Opt	4R	J	3-Opt	——	36x7	40x12S
Paige	½	*895	Own	6	3¼x4½	23.44	66@3200	Pb	DL	P	DR	—	U	3	—	Sp	14.27	4	Tr	115	——	5.50x18B	5.50x18B
Pierce-Arrow PT	2	2950	Own	6	3⅜x4½	33.5	70@2600	Pb	Zen	P		Cla	U	4	Tim	Wo		4	V	160			
Pierce-Arrow PW	3	4150	Own	6	4½x4½	40.3	77@2400	Pb	Zen	P		Cov	U	4	Tim	*Wo		4	W	150			
Pierce-Arrow PY	5	5950	Own	6	4⅝x4¾	51.34	103@2200	Pb	Zen	P		Cov	C	4	Own	*Wo		4	W	160			
Pierce-Arrow PZ	8	6950	Own	6	4¾x5¾	54.15	130@2000	Pb	Zen	P		Own	C	4	Own	*Wo		4	W	168			
Relay Series 15 AA	¾	1370	Con 17 E	6	3⅜x4	27.3	52@2200	Pb	Str	Vac	Aut	W-G	U	4	Own	2R	38.4	4	D	131	3750	30x5P	30x5P
Relay Series 15 AB	1	1400	Con 17 E	6	3⅜x4	27.3	52@2200	Pb	Str	Vac	Aut	W-G	U	4	Own	2R	38.4	4	D	131	3800	P30x5	P30x5
Relay Series S 11	1	1700	Bud H S 6	6	3⅜x4½	27.3	52@2200	Pb	Zen	Vac	Aut	Br-L	U	4	Own	2R	25.5	4	D	142	4050	30x5P	30x5P
Relay Series S 11	1½	1900	Bud H S 6	6	3⅜x4½	27.3	52@2200	Pb	Zen	Vac	Aut	Br-L	U	4	Own	2R	30.0	4	D	162	4500	30x5P	30x5DP
Relay Series 40	1½	2990	Bud D S 6	6	3⅝x5	31.5	56@2000	Pb	Zen	Vac	Aut	Br-L	U	4	Own	2R	34.5	4	D	168	5300	34x5P	34x5DP
Relay Series 40	2	3240	Bud D S 6	6	3⅝x5	31.5	73@2200	Pb	Zen	Vac	Aut	Br-L	U	4	Own	2R	34.5	4	D	168	5500	36x6	D36x6
Relay Series 50	2	3860	Bud D W 6	6	3¾x5	33.7	73@2200	Pb	Zen	Vac	Aut	Br-L	U	5	Own	2R	58.5	4	D	161	6800	36x6	D36x6
Relay Series S 11	2	2030	Bud H S 6	6	3⅜x4½	27.3	52@2200	Pb	Zen	Vac	Aut	Br-L	U	4	Own	2R	30.0	4	D	162	4700	32x6P	32x6DP
Relay Series 40	2½	3275	Bud D S 6	6	3⅝x5	31.5	56@2000	Pb	Zen	Vac	Aut	Br-L	U	4	Own	2R	34.5	4	D	168	5700	36x6	D36x6
Relay Series 50	2½	4000	Bud D W 6	6	3¾x5	33.7	73@2200	Pb	Zen	Vac	Aut	Br-L	U	5	Own	2R	58.5	4	D	161	7000	36x6	D38x7
Relay Series 60	2½	4555	Bud B A 6	6	4⅛x5⅛	40.8	83@2100	Pb	Zen	Vac	Aut	Ful	C	5	Own	2R	58.5	4	D	175	7350	36x6	D36x6
Relay Series 50	3	4130	Bud D W 6	6	3¾x5	33.7	83@2100	Pb	Zen	Vac	Aut	Br-L	U	5	Own	2R	58.5	4	D	161	7200	36x6	D40x8
Relay Series 60	3	4595	Bud B A 6	6	4⅛x5⅛	40.8	83@2100	Pb	Zen	Vac	Aut	Ful	C	5	Own	2R	58.5	4	D	175	7500	36x6	D38x7
Relay Series 80	3	5170	Bud B A 6	6	4⅛x5⅛	40.8	83@2100	Pb	Zen	Vac	Aut	Cov	C	8	Own	2R	84.18	4	D	175	8400	36x6	S40x10
Relay Series 60	3½	4745	Bud B A 6	6	4⅛x5⅛	40.8	83@2100	Pb	Zen	Vac	Aut	Ful	C	5	Own	2R	58.5	4	D	175	7800	38x7	D40x8
Relay Series 80	3½	5330	Bud B A 6	6	4⅛x5⅛	40.8	83@2100	Pb	Zen	Vac	Aut	Cov	C	8	Own	2R	84.18	4	D	175	8600	36x6	S40x12
Relay Series 80	4	5380	Bud B A 6	6	4⅛x5⅛	40.8	83@2100	Pb	Zen	Vac	Aut	Cov	C	8	Own	2R	84.18	4	D	175	8800	38x7	S40x14
Relay Series 50 SW	5	5505	Bud D W 6	6	3¾x5	33.7	83@2100	Pb	Zen	Vac	Aut	Br-L	U	5	Own	2R	54.7	6	D	152	8600	36x6P	36x6DP
Relay Series 100	5	6615	Con 21 R	6	4⅜x4¾	45.9	100@2200	Pb	Str	Vac	Aut	Ful	C	5	Own	2R	58.5	4	D	230	10000	9.00x24	D9.00x24
Relay Series 60 SW	7	6545	Bud B A 6	6	4⅛x5⅛	40.8	100@2200	Pb	Zen	Vac	Aut	Ful	U	5	Own	2R	63.6	6	D	175	12000	38x7P	40x8DP
Reo 15 Junior	½	785	Con '9 E	6	3⅞x4	27.3	60@2800	Pb	Sch	P	DR	W-G	U	3	Sal	Sp	14.63	4	Tr	115	2290	6.00x18	6.00x18
Reo D F 129	1	1095	Own C A	6	3⅜x5	27.3	85@3200	Fb	Sch	Vac	DR	Own	U	3	Own	Sp	17.1	4	Tr	129	3050	6.00x20	32x6
Reo D F	1	1095	Own C A	6	3⅜x5	27.3	85@3200	Pb	Sch	Vac	DR	Own	U	3	Own	Sp	17.1	4	Tr	135	3200	6.00x20	32x6
Reo F A	1½	1295	Own	6	3⅜x5	27.3	67@2800	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	34.32	4	Tr	137	3525	6.00x20	32x6
Reo F E	1½	1395	Own	6	3⅜x5	27.3	67@2800	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	34.32	4	Tr	152	3700	6.00x20	32x6
Reo F F	1½	1395	Own	6	3⅜x5	27.3	67@2800	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	34.32	4	Tr	156	3750	6.00x20	32x6
Reo F H	2	1595	Own	6	3⅜x5	27.3	67@2800	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	37.6	4	Tr	142	4165	32x6	32x6D
Reo F C	2	1645	Own	6	3⅜x5	27.3	67@2800	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	37.62	4	Tr	152	4025	32x6	32x6D
Reo F D	2	1745	Own	6	3⅜x5	27.3	67@2800	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	37.62	4	Tr	168	4075	32x6	32x6D
Reo G A	3	2035	Own	6	3⅜x5	27.3	67@2800	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	41.05	4	Tr	163	4625	32x6	32x6D
Reo G C	3	2140	Own	6	3⅜x5	27.3	67@2800	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	41.05	4	Tr	179	4850	32x6	32x6D
Reo G D	3	2085	Own	6	3⅜x5	27.3	67@2800	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	78.1	4	Tr	144	4570	32x6	32x6D
Reo G C S	3	2375	Own	6	3⅜x5	27.3	67@2800	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	41.05	4	Tr	210	5320	32x6	32x6D
Reo G B	3	2290	Own C F	6	3⅜x5	27.3	67@2800	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	40.52	4	Tr	179	——	7.50x20	7.50x20
Rugby 6-14	½	655	Con	6	3¼x4	25.4	58@3100	Pb	Str	P	Aut	Own	U	3	Own	Sp	15.6	4	4	——	2160	29x5	29x5
Rugby 6-15	1½	930	Con	6	3¼x4	25.4	58@3100	Pb	Str	P	Aut	Br-L	U	4	Sal	Sp	34.49	4	Tr	135	3000	5.50x20	30x5D
Selden 17 C	1½	1560	Con	6	3⅜x4	27.3	61@3000	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Sp	—	4	D	142	3900	32x6	32x6
Selden 317 C	1½	1610	Con	6	3⅜x4⅝	27.34	65@2760	Pb	Str	Vac	Aut	Br-L	U	4	Tim	Sp	—	4	D	142	3900	32x6	32x6
Selden 37 C	2	1935	Con	6	3⅜x4⅝	27.34	65@2760	Pb	Str	Vac	Aut	Br-L	U	4	Tim	Sp	—	4	D	151	4800	32x6	32x6D
Selden 39 C	2½	2920	Con	6	4 x4⅛	38.4	72@2400	Pb	Str	Vac	Aut	Br-L	U	4	Tim	Sp	—	4	D	164	5800	32x6	32x6D
Selden 47 C B	3	3785	Con	6	4 x4½	38.4	85@2400	Pb	Str	Vac	Aut	Br-L	U	4	Tim	Sp	—	4	D	171	7200	34x7	34x7D
Selden 47 C D	4	4435	Con	6	4 x4½	38.4	82@2400	Pb	Str	Vac	Aut	Br-L	U	5	Wis	2R	—	4	D	171	7600	36x8	36x8D
Selden 67 C	5	4975	Con	6	4⅜x4¾	45.94	100@2400	Pb	Str	Vac	Aut	Br-L	C	7	Wis	2R	—	4	D	171	8700	36x8	36x8D
Selden 77	7	7365	Con	6	4¾x5¾	54.15	127@2300	Pb	Str	Vac	Aut	Br-L	C	7	Wis	2R	—	4	D	178	11600	40x8	42x9D
Service Series S 11	1	1600	Bud H S 6	6	3⅜x4½	27.3	52@2200	Pb	Zen	Vac	Aut	Br-L	U	4	Col	Sp	25.5	4	D	142	3900	P30x5	P30x5
Service Series S 11	1½	1900	Bud H S 6	6	3⅜x4½	27.3	52@2200	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Sp	29.2	4	D	162	4300	P30x5	DP30x5
Service Series 40	1½	2990	Bud D S 6	6	3⅝x5	31.5	56@2000	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Wo	34.8	4	D	168	4700	P34x5	DP34x5
Service Series S 11	2	2030	Bud H S 6	6	3⅜x4½	27.3	52@2200	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Sp	29.2	4	D	162	4500	32x6	D32x6
Service Series 40	2	3240	Bud D S 6	6	3⅝x5	31.5	56@2000	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Wo	34.8	4	D	168	4900	36x6	D36x6
Service Series 40	2½	3240	Bud D S 6	6	3⅝x5	31.5	56@2000	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Wo	34.8	4	D	168	5100	P36x6	D36x6
Service Series 60	2½	4580	Bud B A 6	6	4⅛x5⅛	40.8	83@2100	Pb	Zen	Vac	Aut	Ful	U	5	Tim	Wo	63.

NORTHWEST SALES UP IN JANUARY

Minnesota Registrations Close to Year Ago

NEW YORK, Feb. 19.—**Registration of new passenger cars in Minnesota in January amounted to 2,361, as compared with 1,359 in the preceding month, a gain of 73 per cent., and comparing with 2,581 in January, 1930, a decline of 8 per cent.**

In Wisconsin, registrations of new cars last month amounted to 2,897, as against 2,197 in December, 1930, up 31 per cent., and comparing with 4,407 in January of last year, a decline of 34 per cent.

In Minnesota a considerable number of cars were more heavily registered in January than in the corresponding month of last year, while in the neighboring state of Wisconsin few gains over 1930 were registered. Increases over December were general in both states.

Among the cars showing increases in Minnesota over January of last year were Chevrolet, Buick, Willys, Plymouth, Pontiac, Dodge, Essex, Studebaker, Nash, Reo, Cadillac and Marmon.

In Wisconsin gains over a year ago were made by Studebaker, Auburn, Willys, Hudson, Oakland, Marmon, Pierce-Arrow and Cadillac.

Following are the registrations of some of the leading cars in the two states in January, as compared with the corresponding month of last year and the preceding month:

MINNESOTA

	Jan. 1931	Jan. 1930	Dec. 1930
Chevrolet	899	593	545
Ford	645	1,181	442
Buick	100	80	50
Willys	72	32	97
Plymouth	68	62	31
Pontiac	67	46	35
Dodge	61	38	17
Essex	61	48	26
Studebaker	54	51	26
Nash	41	37	22
Packard	31	34	3
Hupmobile	30	41	4
Chrysler	27	69	24
Hudson	26	24	16
Oldsmobile	26	36	8
Graham	22	36	22
Oakland	21	26	8
Reo	16	5	6
Whippet	15	39	7
Cadillac	13	5	12
Durant	11	26	6
Willys-Knight	11	14	3
Marmon	8	4	4
Austin	7	*	1
De Soto	6	11	6
La Salle	6	6	4
Auburn	4	4	1

WISCONSIN

Chevrolet	907	1,096	754
Ford	709	1,558	583
Essex	113	133	50
Nash	106	171	113
Pontiac	105	156	62
Buick	104	176	107
Oldsmobile	97	111	34
Studebaker	94	86	43
Dodge	90	177	73
Auburn	87	6	6
Chrysler	76	100	47
Willys	67	52	43
Hudson	56	52	34
Plymouth	48	72	56
Oakland	39	37	20
De Soto	24	46	25
Graham	24	66	17
Marmon	21	18	7
Willys-Knight	16	16	7
Pierce-Arrow	14	9	4
Reo	13	18	15
Packard	13	30	14
Cadillac	11	7	11
Durant	11	60	14
Hupmobile	10	45	5
Whippet	8	59	7
Austin	6	*	4
La Salle	6	11	6

*Not in production.

OLDSMOBILE ORDERS EXCEED SUPPLY IN OREGON

Portland, Ore., Feb. 19.—Officials of the Oldsmobile Company of Oregon state that orders for 1931 models are exceeding the immediate supply. Delivery is expected within a week or ten days. W. M. Anderson, vice-president, reported the reception accorded the new Oldsmobiles has been unusually gratifying from the dealers' point of view.

Chevrolet Sales in January Show Gains in New Jersey

NEWARK, N. J., Feb. 19.—**Chevrolet dealers from all sections of the state report January new car sales from "even" to 300 per cent. better than in the same period last year.**

Chevrolet dealers reporting the same ratio of sales assert that February business has shown a substantial increase. Used cars sales were reported "better."

The Balderston-Chevrolet, Inc., of Trenton reports its new car sales increased 20 per cent. in January over the corresponding month last year.

"Our used car sales," Franklin Roatch, general manager for the Balderson Company, said "showed an increase of about 250 per cent. This used car figure might be seen to be astonishing, but in January, 1930, we only sold five used cars, which was a very poor record, but had business been normal our increase this year would have been in the same proportion as our new car activities.

"Regarding the first quarter of 1931, we have every reason to believe that new car deliveries will average about a 25 per cent. increase over 1930, due to the fact that the public has been very impressed with the 1931 production. Of course, used cars are the bugaboo of our business, and we will be compelled, like most dealers, to concentrate more on this department."

Frederick Russell, vice-president of the Russell Chevrolet Company of New Brunswick, reports new car sales "exactly three times" those of January, 1930, with used car sales on a par with a year ago. While Mr. Russell believes the first quarter will be very bright, he feels that dealers should adopt "cautious" as their watchword.

Although business in January was reported slow by H. Merrill, vice-president of H. R. Nicholson Chevrolet Company of Clementon, February business so far is better. Mr. Nicholson reports 1930 new car sales ninety-nine cars better than a year ago, with a 100-car gain in used cars.

New car sales in January were on a par with a year ago, according to the H. M. Smith Chevrolet Company of Paterson. Used car sales were approximately the same. The concern expects that the first quarter will exceed the same period of 1930.

George Laesig, president of the B. D. L. Motor Corporation of Union City, reports new car sales 30 per cent. greater than in January last year, with used car business good.

The Laffin Chevrolet Company of South River reports a 20 per cent. increase in new car sales over the same period last year. Used car sales were the same as in January, 1930. The concern expects to maintain its 20 per cent. increase throughout the first quarter.

W. J. Garmany, head of the Garmany Chevrolet sales, South Orange, reports that new car sales in January were equal to the same month last year, with used car sales five units, as against two units in January, 1930.

"I believe," says Mr. Garmany, "that the first quarter of 1931 will be better than 1930, but also feel that the second quarter will show a far greater increase over 1930 than the first three months."

The Reliable Garage of Roselle Park reports new car sales on a par with January last year and used car business slow.

The Cuskaden Chevrolet Company of Atlantic City reports new car sales practically the same as a year ago, with used car business better.

MINNEAPOLIS CONCERN TO DISTRIBUTE PEERLESS CARS

Minneapolis, Minn., Feb. 19.—The Dale Automobile Company, Inc., 728 3d Ave. South, a newly formed organization, will be the Northwest distributor of the Peerless line of motor cars. Eric Dale, for many years active in the automobile and motor car painting business in Minneapolis, heads the new concern. He formerly was head of the Dale Auto Company, a firm handling various lines of cars, including the Buick and Chandler.

FORD LEADS ALL CARS IN SALES IN GERMANY

Berlin, Feb. 19.—The Ford car has taken the lead in sales over all others in Berlin including German-made automobiles. The Ford overtook its nearest competitor, a German car, in October. It continued the lead in November. In Berlin and in Germany as a whole, more Ford trucks are sold than any other make.

BUFFALO NASH MANAGER JOINS W. E. BIGGERS, INC.

Buffalo, N. Y., Feb. 19.—Donald F. McNerney, for the past two years retail manager of the Nash-Buffalo Corporation, has been appointed retail sales manager for the firm of W. E. Biggers, Inc., Plymouth-Dodge distributor, with headquarters in Buffalo.

DULUTH SHOW SETS NEW SALES RECORDS

Duluth, Minn., Feb. 19.—All sales records of automobile shows held in previous years in Duluth were broken at the 1931 show held last week in the Duluth Armory. More sales were made by Duluth and Superior dealers and more prospects booked at the show than at any previous show.

On the opening day of the show, C. A. Vane of Chicago, general manager of the National Automobile Dealers Association, addressed a meeting of fifty Duluth and Superior automobile dealers at Hotel Duluth. Thousands of people from Northern Minnesota, Wisconsin and Michigan, attended the show.

C. R. Dalrymple, secretary of the Head of the Lakes Automotive Trades Association, the dealer organization which sponsored the show, reports that it was an outstanding success from the dealer's standpoint.

SEATTLE MAN PROMOTED TO SERVICE MANAGER

Seattle, Wash., Feb. 19.—Harold Franklin, formerly shop foreman of Packard-Seattle Company, Seattle, has been promoted to the position of service manager for that company. Franklin succeeds Fred Wever, who will continue with the firm in other duties.

SEATTLE MAN LAUNCHES STUTZ DISTRIBUTING CO.

Seattle, Wash., Feb. 19.—J. W. (Jim) Parsons, for many years well-known automobile man of Seattle, has formed the Stutz Distributing Company, and opened offices for business at 2218 4th Ave., Seattle.

Major Specifications and Mechanical Details of 1931 Commercial Cars

(Continued from Page 9)

Make and Model	Capacity—Tons or Lbs.	Chassis Price	Engine	No. of Cyl.	Bore and Stroke	Tax H. P.	Max. Brake H. P. Specified R. P. M.	Oil System	Carburetor	Fuel Feed	Ignit. System	Gear Set	Location	No. Spds. For.	Rear Axle	Final Drive	Reduction in Low	Brakes, Foot	Brakes, Hand	Standard Wheel Base	Chassis Weight	Standard Tire Sizes Front	Standard Tire Sizes Rear
Studebaker S-60	2	945	Own	6	3¼x4½	25.4	68@3200	Pb	Str	P	DR	W-G	U	4	Tim	Sp	37.4	4	4	160	3850	6.50x20	6.50x20D
Studebaker GN-N	4000	1245	Own	6	3⅜x4½	27.3	68@3200	Pb	Str	P	DR	Cla	U	4	Cla	Sp	33.5	4	D	146	3265	30x5	32x6
Studebaker 77	12500	2895	Own	8	3½x4⅜	39.2	115@3200	Pb	Str	P	DR	Ful	U	4	Eat	Sp	24.6	4V	D	158	5030	7.00x20	7.00x20D
Studebaker 88	12500	3295	Own	8	3½x4⅜	39.2	115@3200	Pb	Str	P	DR	Ful	U	4	Eat	Sp	24.6	4V	D	184	5200	7.50x20	7.50x20D
Studebaker 99	14000	3795	Own	8	3½x4⅜	39.2	115@3200	Pb	Str	P	DR	Ful	U	4	Eat	Sp	24.6	4V	D	184	5680	7.50x20	7.50x20D
Whippet 96 A	½	360	Own 96 A	4	3½x4¾	15.6	40@3200	Pw	Til	Vac	Aut	Own	U	3	Own	Sp	15.84	4	B	103¼	1665	4.75x19	4.75x19
White 15 B	——	1545	Own GKA	4	3¾x5½	22.5	31@1600	CS	Zen	Vac	L-N	Own	C	4	Own	Sp	18.6	R	R	133½	3402	30x5	30x5
White 160	——	1700	Own GRCB	4	4 x5¾	25.6	45@1800	Pw	Zen	Vac	DR	Own	U	4	Own	Sp	19.5	4	Tr	138	4025	30x5	30x5
White 161	——	1850	Own GRCB	4	4 x5¾	25.6	45@1800	Pw	Zen	Vac	DR	Own	U	4	Own	Sp	19.5	4	Tr	138	4290	34x7	34x7
White 60	——	1850	Own 2 A	6	3½x4½	29.4	54@2100	Pw	Zen	Vac	DR	Own	U	3	Own	Sp	17.8	4	Tr	138	3739	30x5	30x5D
White 162	——	1900	Own 6 RCB	4	4 x5¾	25.6	45@1800	Pw	Zen	Vac	DR	Own	U	4	Own	Sp	19.5	4	Tr	138	4260	30x5	30x5D
White 210	——	2300	Own 6 RCB	4	4 x5¾	25.6	45@1800	Pw	Zen	Vac	DR	Own	U	4	Own	Sp	23.4	4	Tr	148	4875	30x5	30x5D
White 211	——	2425	Own 6 RCB	4	4 x5¾	25.6	45@1800	Pw	Zen	Vac	DR	Own	U	4	Own	Sp	23.4	4	Tr	148	5110	32x6	32x8D
White 212	——	2700	Own 6 RCB	4	4 x5¾	25.6	45@1800	Pw	Zen	Vac	DR	Own	U	4	Own	Sp	23.4	4	Tr	148	5230	34x7	34x7D
White 61	——	2450	Own 4 A	6	3½x4½	33.7	61@2100	Pw	Zen	Vac	DR	Own	U	4	Own	Sp	23.4	4	D	148	4780	30x5	30x5D
White 56	——	3125	Own GRC	4	4 x5¾	25.6	45@1600	Pw	Zen	Vac	Eis	Own	U	4	Own	Sp	26.2	R	D	165	5276	36x4S	36x7S
White 51 A	——	3750	Own GRB	4	4¼x5¾	28.9	54@1600	Pw	Zen	Vac	Eis	Own	U	4	Own	Sp	35.6	R	D	170	6438	36x5S	36x8S
White 51 AT	——	3875	Own 6 RB	4	4¼x5¾	28.9	54@1600	Pw	Zen	Vac	Eis	Own	U	4	Own	Sp	46.6	R	D	134	6227	36x5S	36x8S
White 620	——	4350	Own 3 A	6	4 x5¼	38.4	72@1800	Pw	Zen	P	DR	Own	U	4	Own	Sp	41.8	4V	D	157	7300	8.25x20B	8.25x20DB
White 58	——	4400	Own GRB	4	4¼x5¾	28.9	54@1600	Pw	Zen	Vac	Eis	Own	U	4	Own	IG	49.7	D	R	180	1797	36x5S	36x5SD
White 65 K	——	4600	Own 3 A	6	4 x5¼	38.4	72@1800	Pw	Zen	P	DR	Own	U	4	Own	Sp	33.9	4V	D	180	7408	8.25x20B	8.25x20DB
White 55	——	4650	Own GRB	4	4¼x5¾	28.9	54@1600	Pw	Zen	Vac	Eis	Own	U	4	Own	IG	66.1	D	R	174	8737	36x5S	40x5SD
White 52 T	——	4700	Own GRB	4	4¼x5¾	28.9	54@1600	Pw	Zen	Vac	Eis	Own	U	4	Own	IG	76.5	D	R	129	8461	36x5S	40x5SD
White 52	——	5100	Own GRB	4	4¼x5¾	28.9	54@1600	Pw	Zen	Vac	Eis	Own	U	4	Own	2R	58.4	D	R	174	9409	36x6S	40x12S
White 630	——	5000	Own 3 A	6	4 x5¼	38.4	72@1800	Pw	Zen	P	DR	Own	U	4	Own	Sp	41.4	4V	D	168	8500	9.00x20B	9.00x20DB
White 610	——	6100	Own 1 A B	6	4⅜x5¾	45.9	96@1800	Pw	Zen	P	L-N	Own	U	4	Own	Sp	33.9	4	D	180	9200	9.00x20B	9.00x20DB
White 641	——	6450	Own 1 AB	6	4⅜x5¾	45.9	96@1800	Pw	Zen	P	L-N	Own	U	4	Own	2R	46.9	4W	D	180	9700	9.25x20B	9.25x20DB
White 642	——	6750	Own 1 AB	6	4⅜x5¾	45.9	96@1800	Pw	Zen	P	L-N	Own	U	4	Own	2R	66.5	4W	D	180	10600	9.25x24B	9.25x24DB
White 643	——	6950	Own 1 AB	6	4⅜x5¾	45.9	96@1800	Pw	Zen	P	L-N	Own	U	4	Own	2R	66.5	4W	D	180	10900	10.50x24B	10.50x24DB
Willys Six C-113	½	395	Own C-113	6	3¼x3⅞	25.3	65@3400	Pw	Til	P	Aut	Own	U	3	Own	Sp	13.20	4	B	113	1872	5.00x19	5.00x19
Willys Six C-131	1½	595	Own C-131	6	3¼x3⅞	25.3	65@3400	Pw	Til	P	Aut	W-G	U	4	Cla	Sp	40.8	4	B	131	2625	5.50x20	6.00x32
Willys-Knight T-103	1½	825	Own KGT	6	2⅞x4⅜	20.7	55@3000	Pw	Til	Vac	Aut	Cov	U	4	Cla	Sp	42.33	4	B	131	2848	5.50x20	30x5

GENERAL NOTATIONS

†REFERENCE MARKS apply to individual lines only and explanations are given under the subdivision for each company in the "SPECIAL NOTATIONS."

CAPACITIES given in this table are in tons or fractions of tons. *Shows maximum allowable gross weight in pounds.

WHEEL BASES given are standard, but optional wheel bases are available in many cases.

ENGINE—Bud, Buda; Con, Continental; Her, Hercules; Kgt, Knight; Lyc, Lycoming; Wak, Waukesha; Wis, Wisconsin; Hall, American Car & Foundry.

LUBRICATION—Pb, pressure lubrication to main and connecting rod bearings; Pw, full pressure lubrication to all main, connecting rod and camshaft bearings, including wrist pins; CS, circulating splash; Sp, splash.

CARBURETOR—Car, Carter; Mar, Marvel; Sch, Wheeler-Schebler; Str, Stromberg; DL, Detroit Lubricator; Til, Tillotson; Zen, Zenith-Detroit.

FUEL FEED—Gra, Gravity; Vac, Vacuum tank; P, Fuel pump.

IGNITION — AB, American-Bosch; Aut, Electric Auto-Lite; Eis, Eisemann; L-N, Leece-Neville; N-E, North East; RB, Robert Bosch; DR, Delco-Remy; Mag, Magneto.

TRANSMISSION—Br, L, Brown-Lipe; Cov, Covert; Ful, Fuller; Mec, Mechanics Machine; Mun, Muncie; W-G, Warner Gear; Cotta Cotta Gear Company; Cla, Clark Equipment Company.

LOCATION—C, center, amid; U, in unit with engine; J, on jackshaft.

REAR AXLE—Cla, Clark Equipment; Col, Columbia; Eat, Eaton; Sal, Salisbury; Tim, Timken; Wis, Wisconsin.

FINAL DRIVE—IG, Internal gear; St, Straight bevel; Sp, Spiral bevel; Wo, Worm; 2R, Double reduction; Ch, Chain; R, Relay drive.

BRAKES—J, Jackshaft; R, Rear wheels; D, Drive shaft; 4, four-wheel; Tr, Transmission; V, Vacuum booster; W, Westinghouse air brake; B, Both front and rear wheels.

TIRES—B, Balloon; D, Dual; S, Solid; P, Pneumatic.

SPECIAL NOTATIONS

AMERICAN-LA FRANCE

*Chief model also available as 2½-ton model, 34x7 tire, dual rear, weight 6,400. Price $3,900.

Chieftain model also available as Dump Truck, 160-inch wheel base.

Balloon tires optional on Chief, Chieftain and Big Chief models.

AUTOCAR

*Engines in these models are located under the driver's seat.

BROCKWAY

*Six wheelers.

CHEVROLET

Utility model available on 131-inch wheel base with chassis weight of 2,760 pounds and equipped with dual rear wheels.

DAY ELDER

Additional standard wheel bases are available on different models as follows:—

60	156	200	165, 180, 204
85	156, 168	240	214
110	168, 186	285	216
130	165, 180, 204	345	216
160	165, 180, 204	402	216

DODGE

*Models F40, F41, F61 and F62 can be had with double drop frame.

DIAMOND T.

*Six wheelers.

F. W. D.

The BTL and BT models are special line construction trucks in which complete provision for mounting AT and T earth boring machine, winch, body and other line construction accessories is included in the standard chassis.

*Indicates six-wheel model.

Special power take-off transmission, which provides 3 power take-offs which may be operated in any transmission speed, optional on all models.

*Foot brake on X6 is a Bendix type, operating on all six wheels.

FEDERAL

*Six wheelers.

GRAMM

Series	Straight Rating	Add. Wheel Base	Pay Load Range
6	10,000	157-174	1¾ tons
B	10,000	157-174	1¾ tons
C	11,000	148-196	2 tons
D	13,000	148-196	2½ tons
E	15,000	148-196	3 tons

†Both the four and six cylinder are also offered in 157-inch wheelbase at $1,145 and $1,345, respectively.

GENERAL MOTORS TRUCK

*Capacity indicated for each chassis is the recommended gross weight without exceeding rated capacity of tires. The tire size does not affect the straight rating for which chassis is guaranteed and each model is designed to operate satisfactorily under average conditions with loads giving a total gross weight (chassis, body, equipment and payload) equal to straight rating given below. The additional standard wheel base lengths, the number of additional tire types (tire combinations—each type carrying a recommended gross weight) and the ton range on a nominal payload basis for each model is given below.

Note: Models T-15 to T-60, inclusive, as well as Models TX and WX, are available as coach chassis for export only.

Model	Straight Rating	Additional Wh. bases.	Additional ins.		Addit'l Tire Types None	Payl'd Range
T-11	3800	None			None	½
T-15	6500	141			9	¾-1¼
T-17	6500	141			6	¾-1¼
T-19	8500	141		151	20	1-2
T-25	9000	141		152	15	1-2
T-30	12500	152		164	13	1½-3
T-42	15000	152	164	181	10	2-4
T-44	16000	152	164	181	10	2-4½
T-60	22000	166¾	184½	200¼	16	2½-6
T-82	24000	167½	185½	201	10	3-7
T-90	28000	201		220	5	5-7½

Optional rear axle ratios are available for all models. Double reduction axles available for Models T-60 and T-82.

INDIANA

*Six wheelers.

MACK

Other wheel bases furnished on all truck models.

On 6-wheel jobs, 4 rear wheels driven by chains, foot brake on 4 rear wheels.

HYP—Hypoid drive, single reduction.

††Made also in tractor models.

PAIGE

*Price includes panel or screen body.

PIERCE-ARROW

*Optional final drive on Models PW, PY and PZ.

REO

Model F A also available in 129-inch wheel base.

SELDEN

Additional standard wheel bases are available on different models as follows:—

Model 37C	162 and 181
39C	177 and 190½
47CB, 47CD	151, 164 and 184
67C	151, 164, 184 and 198

STEWART

Models 30 and 30X can also be supplied in 110, 120 and 140-inch wheel base.

Models 40 and 40X can also be supplied in 110, 140 and 160-inch wheel base.

*Model 34X can be supplied in 135, 145, 160 and 176-inch wheel base.

Model 28X can be supplied in 130, 145, 160 and 176-inch wheel base.

Model 29XS can be supplied in 135, 160 and 176-inch wheel base.

*Model 26XW can be supplied in 148, 176 and 190-inch wheel base.

*Models 18X, 32X and 33X can be supplied in 148, 190 and 220-inch wheel base.

*Models 19X, 31X and 27X can be supplied in 148, 172, 190, 220 and 235-inch wheel base.

As optional equipment models 18X, 19X, 33X, 31X and 27X can be supplied with Timken dual reduction rear axle.

STUDEBAKER

*Capacity model GN-N is 4,000 pounds for body, cab, driver and payload.

Maximum gross load, chassis, body and payload for Models 77 and 88 is 12,500 lbs. and for Model 99 is 14,000 lbs.

‡Hand brake same as foot brake, standard. Hand brake on drive shaft, special equipment.

Passenger Car Equipment and Accessories

NAME AND MODEL	Speedometer	Clock	Fuel Gauge on Dash	Lock	Spark Plugs	Battery	Heat Indicator	*Cig. Lighter	Smoking Set	Vanity Set	Make of Body Finish Used	Stop Light	Parking or Side Light	Windshield Wings	Heater	Front Bumper	Rear Bumper	Wire Wheels	Shock Absorber
Auburn 8-98	Ste	—	K-S	Ele	Cha	USL	—	Cas	—	—	—	Ind	Ind	—	—	Cen	Cen	MotoW	Lov
Austin	NE	—	K-S	BS	Cha	USL	—	—	—	—	Duc	—	—	—	—	Cen	Cen	—	Own
Buick 8-50	AC	—	K-S	Her	AC	**	AC	—	Tern	—	Duc	Gui	Gui	—	—	Wol	Wol	K-H	Lov
Buick 8-60	AC	—	K-S	Her	AC	**	AC	—	Tern	—	Duc	Gui	Gui	—	—	Wol	Wol	K-H	Lov
Buick 8-80	AC	—	K-S	Her	AC	**	AC	—	Tern	—	Duc	Gui	Gui	—	—	Wol	Wol	K-H	Lov
Buick 8-90	AC	—	K-S	Her	AC	**	AC	—	Tern	Tern	Duc	Gui	Gui	—	—	Wol	Wol	K-H	Lov
Cadillac V-8	AC	Jag	Mot-M	DR	AC	DR	AC	Cas	Tern	Tern	Duc	Hal	Hal	—	Kel	Eat	Eat	K-H	Lov
Cadillac V-12	AC	Jag	Mot-M	DR	AC	Ex	AC	Cas	Tern	Tern	Duc	Hal	Hal	—	**	Eat	Eat	K-H	Lov
Cadillac V-16	AC	Jag	Mot-M	DR	AC	Ex	AC	Cas	Tern	Tern	Duc	Gui	Hal	—	*	Gen	Gen	K-H	Lov
Chevrolet	AC	—	AC	DR	AC	*	AC	—	Tern	—	Duc	Gui	Gui	—	*	†Own	Own	K-H	Lov
Chrysler 6	NE	—	Mot-M	DR	AC	Wil	Yes	—	—	—	—	Cor	Cor	—	—	—	—	—	Lov
Chrysler 8	NE	—	Mot-M	DR	AC	Wil	Mot-M	—	—	—	—	Hal	Hal	—	—	—	—	—	Lov
Chrysler Imp. 8	AC	—	Mot-M	DR	AC	Wil	Mot-M	Cas	—	—	—	Hal	Hal	—	—	—	—	—	Hou
Cord Front Drive	Ste	No	Mot-M	DR	Cha	USL	Ster	Cas	GR	No	Mur	Ind	Ind	No	No	ASP	ASP	Day	Hou
De Soto Six	NE	No	Mot-M	DR	AC	Wil	Yes	No	Yes	Yes	Duc	Cor	Hal	No	No	Yes	Yes	—	Lov
De Soto Eight	NE	No	Mot-M	DR	AC	Wil	Mot-M	No	Yes	Yes	Duc	Cor	Hal	No	No	Yes	Yes	—	Lov
Dodge Six	NE	—	Mot-M	DR	AC	Wil	—	—	VS	VS	—	Cor	—	—	—	Yes	Yes	—	Lov
Dodge Eight	NE	—	Mot-M	DR	AC	Wil	Mot-M	—	VS	VS	—	Cor	—	—	—	Yes	Yes	—	Lov
Durant 6-10	NE	No	K-S	Aut-L	Cha	USL	Mot-M	NE	No	No	—	Cor	—	—	—	Bad	Bad	K-H	Sim
Durant 6-12	NE	No	K-S	Aut-L	Cha	USL	Mot-M	NE	No	No	—	Cor	—	—	—	Eat	Eat	K-H	Sim
Durant 6-14	NE	No	K-S	Aut-L	Cha	USL	Mot-M	NE	GR	No	—	Cor	—	—	—	Eat	Eat	MotoW	Mon
Essex Super Six	Ste	—	Mot-M	Ele	AC	Ex	Mot-M	—	—	—	—	JB	JB	—	—	Own	Own	†MotoW	Mon
Ford A	Var	—	Own	Ele	Cha	Own	—	—	—	—	—	Own	—	—	—	Own	Own	Own	Hou
Franklin Series 15	NE	Wal	K-S	DR	Cha	Nat	—	Cas	*	GR	*	Cor	Cor	—	—	Gen	Gen	MotoW	Lov
Graham Stan. 6	NE	—	K-S	Her	Cha	Wil	Mot-M	—	GR	—	—	—	—	—	—	ASP	ASP	MotoW	Lov
Graham Sp. 6	NE	—	K-S	Her	Cha	Wil	Mot-M	—	GR	—	—	—	—	—	—	ASP	ASP	MotoW	Lov
Graham Sp. 8	NE	—	K-S	Her	Cha	Wil	Mot-M	—	GR	—	—	—	—	—	—	ASP	ASP	MotoW	Lov
Graham Cust. 8	NE	*	K-S	Her	Cha	Wil	Mot-M	Cas	VS	—	—	—	—	—	—	ASP	ASP	MotoW	Lov
Hudson Greater 8	Ste	—	Mot-M	Ele	AC	Ex	Mot-M	—	—	—	—	Hal	Hal	—	—	Own	Own	†MotoW	Gab
Hupmobile Cen. 6	Ste	—	Mot-M	Ele	Cha	Wil	Mot-M	—	VS	—	Val	Cor	Cor	—	—	—	—	K-H	Gab
Hupmobile Cen. 8	Ste	—	Mot-M	Ele	Cha	Wil	Mot-M	—	VS	—	Val	Hal	Hal	—	—	—	—	K-H	Gab
Hupmobile U	Ste	—	Mot-M	Ele	Cha	Wil	Ster	Cas	VS	—	Val	Hal	Hal	—	—	—	—	K-H	Gab
Hupmobile H	Ste	—	Mot-M	Ele	Cha	Wil	Ster	Cas	VS	—	Val	Hal	Hal	—	—	—	—	K-H	Gab
Hupmobile C	Ste	—	Mot-M	Ele	Cha	Wil	Ster	—	VS	—	Val	Hal	Hal	—	—	—	—	K-H	Gab
La Salle V-8	AC	Jag	Mot-M	DR	AC	DR	AC	Cas	Tern	Tern	Duc	Hal	Hal	—	*	Eat	Eat	K. H	Lov
Lincoln 8	NE	Wal	K-S	Her	Cha	Ex	Mot-M	Cas	Cuno	Yes	Duc	Hal	Own	Own.	—	Bif	Bif	Own	Hou
Marmon 70	Ste	—	Mot-M	DR	Cha	Nat	Mot-M	—	—	—	*	Cor	Cor	—	—	—	—	Bimel	Lov
Marmon 88	NE	Ster	Mot-M	DR	Cha	Ex	Mot-M	Cas	—	—	*	Cor	Cor	—	—	Gen	Gen	Bimel	Lov
Marmon 16	—	—	—	—	Cha	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nash Six-60	AC	—	K-S	Her	AC	USL	AC	—	Tern	—	*	JB	JB	—	—	Cen	Cen	†MotoW	Lov
Nash Eight-70	AC	—	K-S	Her	AC	USL	AC	—	VS	—	*	JB	JB	—	—	Cen	Cen	†MotoW	Lov
Nash Eight-80	Ste	—	K-S	Blos	AC	USL	AC	—	VS	—	*	JB	JB	—	—	Cen	Cen	†MotoW	Lov
Nash Eight-90	Ste	Borg	K-S	Blos	AC	Ex	Mot-M	Cas	VS	—	*	JB	JB	—	—	Eat	Eat	†MotoW	Lov
Oakland 8	AC	—	K-S	DR	AC	DR	AC	—	Tern	Tern	Duc	Gui	Gui	—	—	Own	Own	—	Lov
Oldsmobile	AC	—	AC	DR	AC	Wil	AC	—	Tern	—	Duc	Gui	—	—	—	—	—	MotoW	Lov
Packard 826	NE	Jag	K-S	—	Cha	Pre	Mot-M	Cas	—	—	—	Hal	—	—	—	Cen	Cen	—	Lov
Packard 833	NE	Jag	K-S	—	Cha	Pre	Mot-M	Cas	—	—	—	Hal	—	—	—	Cen	Cen	—	Lov
Packard 840	NE	Jag	K-S	—	Cha	Pre	Mot-M	Cas	—	—	—	Hal	—	—	—	Cen	Cen	—	Lov
Packard 845	NE	Jag	K-S	—	Cha	Pre	Mot-M	Cas	—	—	—	Hal	—	—	—	Cen	Cen	—	Lov
Peerless Stand. 8	AC	Ster	Mot-M	BS	Cha	Wil	Mot-M	Cas	—	No	Val	Cor	Cor	No	No	Cen	Cen	Bimel	Gab
Peerless Mast. 8	AC	Ster	Mot-M	BS	Cha	Wil	Mot-M	Cas	—	No	Val	Cor	Cor	—	—	Cen	Cen	Bimel	Gab
Peerless Cust. 8	AC	Ster	Mot-M	BS	Cha	Wil	Mot-M	Cas	—	No	Val	Cor	Cor	—	—	Eat	Eat	Bimel	Gab
Pierce-Ar'w 41-2-3	NE	Wal	**	Her	Cha	Wil	US	NE	VS	VS	—	—	—	—	—	Eat	Eat	Budd	Lov
Plymouth	NE	—	Yes	Sha	AC	Wil	—	—	—	—	Duc	Cor	Cor	—	—	Gen	Gen	‡	Lov
Pontiac	AC	—	K-S	DR	AC	Pre	—	—	Tern	—	Duc	—	—	—	—	Own	Own	—	Lov
Reo Royale	Ste	Elgin	K-S	DR	Cha	Wil	—	Yes	Yes	No	Ditz	—	Gui	No	No	Gen	Gen	MotoW	Lov
Reo Fly'g Cloud 8	Ste	Elgin	K-S	DR	Cha	Wil	—	Yes	Yes	No	Ditz	—	Gui	No	No	Gen	Gen	MotoW	Lov
Reo Fly'g Cloud 6	Ste	Elgin	K-S	DR	Cha	Wil	—	Yes	Yes	No	Ditz	—	Gui	No	No	Gen	Gen	MotoW	Lov
Studebaker Six	Ste	—	K-S	Yale	Cha	Wil	Ste	—	—	—	*Var	Ind	Ind	—	No	Ste	Ste	K-H	Lov
Studebak'r Dict. 8	Ste	—	K-S	Yale	Cha	Wil	Ste	—	—	—	*Var	Ind	Gui	—	—	Ste	Ste	K-H	Lov
Stud. Com. 8-70	Ste	—	K-S	Her	Cha	Wil	Ste	—	—	—	*Var	Gui	Gui	—	—	Ste	Ste	K-H	Lov
Stud. Pres. 8-80	Ste	NH	K-S	Her	Cha	Wil	Ste	Cas	*	—	*Var	Gui	Gui	—	—	Ste	Ste	K-H	Hou
Stud. Pres. 8-90	Ste	NH	K-S	Her	Cha	Wil	Ste	Cas	*	—	*Var	Gui	Gui	—	—	Ste	Ste	K-H	Hou
Stutz LA	Ste	Wal	Mot-M	DR	Cha	Pre	Mot-M	Cas	No	Lin	Val	Ind	—	—	—	Buck	Buck	MotoW	Gab
Stutz MA	Ste	Wal	Mot-M	Her	Cha	Pre	Mot-M	Cas	Lin	Lin	Val	Ind	—	—	—	Stan	Stan	MotoW	Gab
Stutz MB	Ste	Wal	Mot-M	Her	Cha	Pre	Mot-M	Cas	Lin	Lin	Val	Ind	—	—	—	Stan	Stan	MotoW	Gab
Willys 97-98 D	NE	No	K-S	Ele	Cha	USL	—	—	No	No	*	Yes	Yes	No	No	No	No	—	Mon
Willys 8-80 D	NE	No	K-S	Ele	Cha	USL	Yes	—	Yes	No	*	Yes	Yes	No	No	No	No	—	Mon
Willys-K. 66D	NE	No	K-S	Ele	Cha	USL	Yes	—	Yes	No	*	Yes	Yes	No	No	No	No	—	Mon

KEY TO ABBREVIATIONS USED IN THIS TABLE

SPEEDOMETER
AC—AC Spark Plug Co., Flint, Mich.
NE—North East Appliance Corp., Rochester, N. Y.
Ste—Stewart-Warner Speedometer Corp., Chicago.
Var—Various makes.

CLOCK
Borg—Borg Clock Co.
Elgin—Elgin Watch Co.
Jag—Jaeger Watch Co., New York city.
NH—New Haven. See Phi.
Phi—Phinney-Walker Co., New York city.
Ster—Sterling Clock Co., La Salle, Ill.
Wal—Waltham Watch Co., Waltham, Mass.
*Optional.

FUEL GAUGE
AC—AC Spark Plug Co., Flint, Mich.
K-S—King Seeley Corp., Ann Arbor, Mich.
Mot-M—Moto Meter Gauge and Equipment Corp., Long Island City, N. Y., and La Crosse, Wis.
**—Pierce-Arrow uses both Moto-Meter and King Seely.

LOCK
Aut-L—Electric Auto-Lite Co., Toledo.
BS—Briggs-Stratton Co., Milwaukee.
Blos—Blossom, Delco-Remy Corp., Anderson, Ind.
Ele—Mitchell Specialty Co., Holmesburg, Pa.
DR—Delco-Remy Corp., Anderson, Ind.
Her—Hershey Mfg. Co., Chicago.
Joh—Johnson Automobile Lock Co., St. Louis, Mo.
NE—North East Appliance Corp., Rochester, N. Y.
Sha—Shaler Lock Co., Milwaukee, Wis.
Yale—Yale & Towne Mfg. Co.

SPARK PLUG
AC—AC Spark Plug Co., Flint, Mich.
Cha—Champion Spark Plug Co., Toledo, O.

BATTERY
DR—Delco Remy Corp.
Ex—Electric Storage Battery Co., Philadelphia.
Nat—National Lead Battery Co., St. Paul, Minn.
Pre—Prest-O-Lite Co., Indianapolis, Ind.
USL—U S L Battery Corp., Niagara Falls, N. Y.
Wil—Willard Storage Battery Co., Cleveland, O.
*Various makes—Exide, Willard, Delco-Remy and USL.
**Both Exide and Delco-Remy used.

HEAT INDICATOR
AC—AC Spark Plug Co., Flint, Mich.
Mot-M—Moto Meter Gauge and Equipment Corp., Long Island City, N. Y., and La Crosse, Wis.
Ste—Stewart-Warner Speedometer Corp.
Ster—Sterling Clock Co., La Salle, Ill.
US—U. S. Gauge Co., N. Y. C.

CIGAR LIGHTER
*Cigar lighters in many cases are optional equipment, and are not standard on all models; the names of lighters shown indicate the makes supplied to various car makers.
Cas—Casco Products Corp., Bridgeport, Conn.
NE—North East Appliance Corp., Rochester, N. Y.
Cuno—Cuno Engineering Corp., Meriden, Conn.

SMOKING AND VANITY SETS
AWS—Art Metal Works, Newark, N. J.
GR—Grand Rapids Metalcraft Corp., Grand Rapids, Mich.
Lin—Linden.
VS—Van Sicklen Corp., Elgin, Ill.
Tern—Ternstedt Mfg. Co., Detroit, Mich.
Cuno—Cuno Engineering Corp., Meriden, Conn.
*Various makes.

BODY FINISH
Ditz—Ditzler Color Co., Detroit, Mich.
Duc—E. I. du Pont de Nemours & Co., Philadelphia.
Gli—Glidden Co., Cleveland, O.
Mur—Murphy Varnish Co., Newark, N. J.
Val—Valentine & Co., New York city.
*Various lacquers used.
†Using Glidden and Ditzler.

STOP AND PARKING LIGHTS
Cor—Corcoran Lamp Co.
Gui—Guide Lamp Corp., Anderson, Ind.
Hal—C. M. Hall Lamp Co., Detroit, Mich.
Ind—Indiana Lamp Corp., Connersville, Ind.
JB—The Jno. W. Brown Lamp Mfg. Co., Columbus, O.

HEATER
Kel—Kelch made by Grand Rapids Metalcraft Corp., Grand Rapids, Mich.
*Optional.
**Not standard equipment on Cadillac V-12

BUMPERS
ASP—Alloy Steel Products.
Bad—Badger Mfg. Corp., Milwaukee.
Buf—Buflex Corp., Waukegan, Ill
Buck—See Cen.
Cen—Central Brass & Fixture Co., Springfield, O. Also makers of Buckeye bumpers.
Eat—Eaton Axle and Spring Co., Cleveland, O.
Gen—General Spring and Bumper, Detroit.
Stan—Standard Steel Spring Corp.
Ste—Stewart-Warner Speedometer Corp.
Wol—Wolverine Bumper & Spec. Co.
†Extra equipment.
*Also using Eat.

WIRE WHEELS
Bimel—Bimel Spoke and Auto Wheel Co., Portland, Ind.
Budd—Budd Wheel Co., Detroit.
MotoW—Motor Wheel Corp., Lansing, Mich.
Day—Dayton Wire Wheel Co., Dayton, O.
K-H—Kelsey-Hayes, Detroit, Mich.
Buffalo—Wire Wheel Corp. of America, Buffalo, N. Y.
‡Using both Kelsey-Hayes and Motor Wheel Corp.
†Not standard equipment.

SHOCK ABSORBERS
Gab—The Gabriel Company, Cleveland.
Hou—Houde Engineering Corp., Buffalo N. Y.
Lov—Delco Products Corp., Dayton, O.
Mon—Monroe Auto Equip. Mfg. Co., Monroe, Mich.
Sim—Simplex Reboard Clips.

FINANCE ASSOCIATION FAVORS CONN. BILL ON CHATTEL MORTGAGES

(Continued from Page 1)

gages on automobiles and other personal property remaining in the possession of the mortgagor. At the present time there are only two states in the Union, namely, Connecticut and Pennsylvania, where such a mortgage is not valid. In all other states it is possible to use the chattel mortgage as a security instrument to retain a lien on goods sold on the installment plan or other deferred payment plan or on goods pledged as security for a loan.

"The fact that all but two states follow this practice, most of them having done so for many years, should certainly be sufficient proof that Connecticut can do so without incurring any objectionable results. The enactment of this bill will bring Connecticut in line with other states. It will be a decided advantage to borrowers of limited means, often making it possible for them to obtain loans which, under present conditions, are unavailable. It will also be of some advantage to merchants who sell goods on the installment plan, as there are cases where it is preferable to use the chattel mortgage instead of the conditional sales contract in connection with such sales."

OKLAHOMA MEASURE IS CITED BY N.A.F.C.

(Continued from Page 1)

the vendor of tires, tubes and accessories a lien upon the motor vehicle on which the goods have been placed.

"This lien is not to be merged with or subject to prior liens on such motor vehicles, and under this proposition, the seller of the tires or accessories may bring suit for the price of the goods and may obtain order of court for the sale of the vehicle to satisfy a judgment for the price of tires and accessories," the N. A. F. C. states.

"The bill makes no provision for safeguarding the rights of any prior lienor, so that apparently the seller of the motor vehicle on the instalment plan might have his equity extinguished by the act of a subsequent seller of a tire. This is obviously most unjust. The bill should be amended by the inclusion of a clause to the effect that the lien thereby created is subject to any prior existing conditional sales contract, chattel mortgage or other valid liens.

"In any case, the vendors of tires and accessories have no need for such protection as is here afforded. All they need to do is to sell their tires or other accessories under a conditional sales contract; afterward if payment is not made, they may repossess the tires or accessories under the provisions of their contract, whether the car is still in possession of the owner or has been repossessed by the original seller, or his assignee."

Contemporary Comment

(Continued from Page 4)

States Department of Agriculture. The cost of clearing 184,748 miles amounted to $8,224,368, the reports show.

The patrol system is considered the best method for keeping the roads open, says the bureau. A definite section of highway is assigned to a patrol officer and crew with the necessary equipment of trucks, tractors or graders. The crews go to work at the start of snowfall, and work on the given route until the road is clear.

Drift prevention continues to be of considerable importance, and the mileage of snow fence is increasing yearly, according to the reports. About 8,200 miles of fence were used last season, an increase of about 40 per cent. over the preceding winter.

There were no important changes in the type of equipment used for snow removal. State and local agencies report a total of 7,372 trucks, 2,788 tractors and 2,587 graders used in the clearing of 184,748 miles of highways.—**Goodyear News.**

Steel Personality

(Continued from Page 6)

while the sections in other parts will not permit the maximum hardness to be obtained. As a compromise, the hardening is governed according to the old rule of "quench according to the thinnest section." At the right of Fig. 1 is shown a part which has been hardened, cut in two and etched to show the distribution of hardness. The production of high-quality parts of this character necessitates control of timbre to obtain maximum service life.

Steel, therefore, cannot be purchased indiscriminately with chemical composition and cleanness as a sole specification.

In the paper on hardenability, above mentioned, the present writer described a test for the determination of this quality which has been amplified. The test now includes the width of quenching range by varying the quenching temperature over a wider range. Briefly, the test consists of quenching dics of steel which have been step-ground in 1/32-inch steps. These discs are quenched in a special brine spray (although still brine is also satisfactory) and broken to study the fracture or cut in two and etched. For any temperature, the hadenability number is taken as the numerator of the fractional thickness in thirty seconds of an inch of the thinniest section to have a core after this operation.

A comparison was made to determine the indifference in timbre in the product of three different manufacturers—the steel being made of 1.00 to 1.10 carbon tool steel. The results are shown in Fig. 2 and are to a certain extent self-explanatory. It is important to note that the discs shown are duplicate discs, and not halves of the same disc; they show a very good check upon the hardening method and response of the steel to this operation. Previous experience with steels H1 and R1 indicated that the tests need only be made on the 10-32, 11-32 and 12-32 in. sections. On steel F1 it was necessary to use six ranges of thickness, as its timbre characteristics were unknown, but on the 1,600 deg. F. quench only one disc with three thicknesses was used.

The hardenability of steels R1 and H1 is not changed until 1,550 degrees Fahrenheit was reached. At this temperature the hardenability increased from No. 11 to No. 12, and a further increase of 50 degrees increased the hardenability to No. 13. Samples of each of these steels quenched from 1,550 and 1,600 degrees Fahrenheit showed slight hardening cracks and a tendency to check in grinding, the latter temperature showing these to a greater extent. Fracture of each of these steels showed no appreciable coarsening from the higher temperatures, although the specimens were hardened through and had a "drier" appearance than the others.

Steel F1 had poor timbre. The hardenability changed rapidly with increase in hardening temperature. The fracture started to coarsen badly at 1,500 degrees Fahrenheit, and at 1,600 degrees Fahrenheit was quite crystalline. This steel cracked badly in hardening at 1,500 degrees Fahrenheit and over, and was especially prone to grinding cracks.

These characteristics are also reflected in the carburizing operation. To show this the discs of each of these three steels approximately one-half inch thick were carburized at 1,725 degrees Fahrenheit, and allowed to cool in the pot. A secto taken from each disc was examined along a longitudinal radial section. A marked difference in the response of these three steels to the carburizing operation was shown by macrographs.

Metallographic examination at 1,000 diams. showed a still greater difference. The core of this piece was composed of both abnormal and distinctly lamellar pearlite grains.

Steel F1 (with poor timbre) was distinctly normal. Excess carbide in the case surrounds the grains of distinct lamellar pearlite. The excess carbide in the core is also around the grain boundaries, the grains themselves being sarbitic pearlite. Small particles of carbide were observed coming out of solution. All the grains in the core had this same type of grain structure.

Excess carbide in the case of steel R1 was principally in the form of intrgranular needles, with small amounts at the grain boundaries. Some of the grains in the core were distinctly abnormal, some distinctly lamellar pearlite. This steel, therefore, cannot be classified as distinctly normal or abnormal.

means of the McQuaid-Ehn test) are that normal steel has poor timbre and that good timbre steels are not necessarily distinctly abnormal steels. However, I think it is the definite aim of manufacturers desiring good timbre to try to make abnormal steel.

There are still other differences between steels of equal timbre characteristics. Extensive experience has shown that steel from manufacturer H would, after hardening and etching, show a more distinct border line between the case and the core than steel from manufacturer R. This difference is illustrated in Figure 1, where the 12-32-inch sections of the hardenability test discs quenched from 1,450 are magnified about three times. The characteristic difference in border line condition is very marked. At higher magnifications (about forty diams.) the difference is still more pronounced and is directly attributable to a difference in the critical cooling rate of the grains themselves. The difference between these two steels was previously shown to exist in the cores of the samples cooled slowly from the carburizing temperature; steel H1 had grains which were entirely lamellar or abnormal, and steel R1 had both sorbitic and lamellar pearlite grains. We attribute this condition to a difference in the critical cooling rate of the individual grains.

A larger dendritic structure in one steel (with corresponding, though very slight, structural heterogenity) carries on into the finished bar, often resulting in a fibrous structure.

Timbre exists not only in tool steel but in various alloy steels.

An illustration of the difference in response to a standard heat treatment of three heats of S. A. E. 3250 is shown in Fig. 3. These pieces were oil treated from 1,500 degrees F., annealed at 1,330 degrees, then oil treated from 1,450 degrees F. and drawn at 525. Chemical analysis is almost identical:

C	Mn	P	S	Si	Ni	Cr
0.50	0.50	0.019	0.011	0.28	1.66	1.18
0.48	0.43	0.02	0.012	0.14	1.65	1.07
0.50	0.45	0.017	0.014	0.18	1.58	1.13

The difference in timbre has changed the Guillery impact values about 100 per cent., they being 2.5, 3.5 and 5.5 kg-m., respectively.

Furnace practice also has a marked effect upon the timbre obtained in chrome-vanadium carburizing steel, and this difference in timbre has a tremendous effect upon the service life of parts made from either type of steel. Fractures of representative discs of three heats of this material are shown on this page. These discs have been given the same heat treatment: Carburize at 1,625 degrees Fahrenheit for ten hours after reaching heat, cool in pot, reheat to 1,625 degrees Fahrenheit, quench in oil, reheat to 1,475 degrees Fahrenheit, quench in brine. The difference in core structure is quite obvious, yet the chemical analysis is quite similar, all heats conforming to this specification:

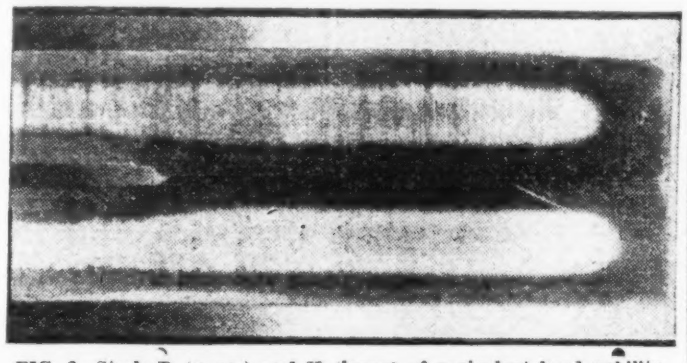


FIG. 2—Steels R (upper) and H (lower) of equivalent hardenability show marked difference in the border between hardened surface and softer core

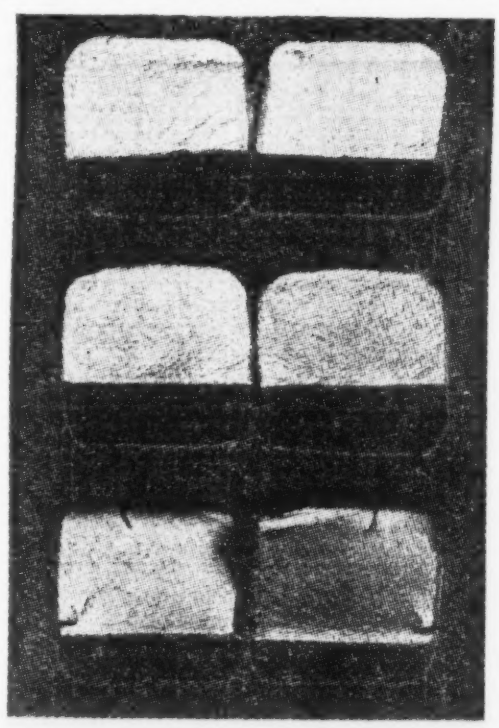


FIG. 3—Fineness of fracture is a guide to impact strength of heats of S. A. E. 3250 of practically identical composition and hardness

	C	Mn	P	S	Si	Cr	V	Ni
Min.	0.18	0.60	...	....	0.10	0.70	0.15	...
Max.	0.24	0.80	0.03	0.03	0.20	1.00	0.20	0.20

The difference in performance of heats of steel having the same type analysis has often been noted before. Failure of parts has frequently been unsolved after applying all available methods at our command. Many of these failures occurred even though the engineering factor of safety was very high and the material met the specification requirements.

That difference in quality of materials, which is not usually ascertained until trouble develops in fabrication or in the field, I call "steel personality," or "timbre." Development of tests to determine timbre in alloy steels is very much to be desired. The use of such a test on tool steel and the purchase of tool steel with timbre as one of the main criteria of selection (rather than the present emphasis upon narrow chemical limits) will result in an improved product.

Automotive Sales Near Top In Indiana and Ohio Census

(Continued from Page 3)

building group third in order of sales.

The automotive group, with eighty establishments, does a business of $3,603,861, or 24 per cent. of the total retail business. Sales in twelve motor-vehicle establishments amount to $2,131,936, and sales in nine accesory, tire and battery stores to $345,637. A total of forty-two filling stations is reported with aggregate sales of $935,496 in gas, oil, tires and other accessories. This merchandise is also sold in sixteen garages, whose total business of $171,796 includes receipts from repairs and storage.

Retail business in Ironton, O., was in excess of $7,000,000. The 1930 population of Ironton was 16,621.

The food group takes the lead in this report, with the automotive group second and the general merchandise group third in order of sales.

The automotive group, with thirty-six establishments, does a business of $1,746,158, or 24 per cent. of the total retail business. Sales in twelve motor-vehicle establishments amount to $1,352,205, and sales in nine accessory, tire and battery stores to $116,893. A total of fifteen filling stations is reported, with aggregate sales of $277,060 in gas, oil, tires and other accessories.

Retail business in Niles, O., was in excess of $6,000,000. The 1930 population of Niles was 16,314.

The food group takes the lead in this report, with the automotive group second, and the lumber and building group third in order of sales.

The automotive group, with thirty-five establishments, does a business of $1,356,554, or 21 per cent. of the total retail business. Receipts in ten motor vehicles establishments amount to $940,718 and sales in three accessory, tire and battery stores to $54,794. A total of sixteen filling stations is reported with aggregate sales of $306,656 in gas, oil, tires and other accessories. This merchandise is also sold in six garages, whose total business of $54,386 includes receipts from repairs and storage.

Retail business in Painesville, O., was in excess of $8,000,000. The 1930 population of Painesville was 10,944.

The automotive group takes the lead in this report, with the food group second and the general merchandise group third in order of sales.

The automotive group, with forty-three establishments, does a business of $2,818,640, or 33 per cent. of the total retail business. Sales in eleven motor vehicle establishments amount to $2,056,846 and sales in eleven accessory, tire and battery stores to $268,138. A total of fourteen filling stations is reported with aggregate sales of $421,008 in gas, oil, tires and other accessories. This merchandise is also sold in seven garages, whose total business of $72,648 includes receipts from repairs and storage.

Retail business in Sandusky, O., was in excess of $15,000,000. The 1930 population of Sandusky was 24,622.

The automotive group takes the lead in this report, with the food group second and the general merchandise group third in order of sales.

The automotive group, with seventy-eight establishments, does a business of $4,128,626, or 27 per cent. of the total retail business. Receipts in twenty motor vehicle establishments amount to $3,084,327, and sales in eight accessory, tire and battery stores to $134,059. A total of thirty-one filling staitons is reported with aggregate sales of $711,719 in gas, oil, tires and other accessories. This merchandise is also sold in sixteen garages whose total business of $176,021 includes receipts from repairs and storage.

Retail business in Tiffin, O., was in excess of $9,000,000. The 1930 population of Tiffin was 16,428.

The automotive group takes the lead in this report, with the food group second and the lumber and building group third in order of sales.

The automotive group, with 59 establishments, does a business of $2,248,169, or 24 per cent. of the total retail business. Receipts in 10 motor vehicle establishments amount to $1,396,426 and sales in 8 accessory, tire and battery stores to $214,953. A total of 23 filling stations is reported with aggregate sales of $477,770 in gas, oil, tires and other accessories. This merchandise is also sold in 16 garages, whose total business of $150,700 includes receipts from repairs and storage.

Figures for two Indiana cities are as follows:

Retail business in New Albany, Ind., was in excess of $10,700,000. The 1930 population of New Albany was 25,819.

The food group takes the lead in this report, with the automotive group second, and the lumber and building group third in order of sales.

The automotive group, with fifty-nine establishments, reports sales of $2,450,223, or 23 per cent. of the total retail business. Sales in eleven motor vehicle establishments amount to $1,634,116. A total of twenty-five filling stations is reported with aggregate sales of $599,171 in gas, oil, tires and other accessories. This merchandise is also sold in twenty garages, which report a business of $176,809, and this figure includes receipts from repairs and storage.

Retail business in Kokomo, Ind., was in excess of $15,000,000. The 1930 population of Kokomo was 32,843.

The food group takes the lead in this report, with the automotive group second and the general merchandise group third in order of sales.

The automotive group, with fifty-seven establishments, does a business of $2,961,167, or 19 per cent. of the total retail business. Receipts in ten motor vehicle establishments amount to $1,519,730, and sales in nine accessory, tire, and battery stores to $348,820. A total of thirty-three filling stations is reported with aggregate sales of $784,167 in gas, oil, tires, and other accessories. Of the thirty-three filling stations, nine are single-station independents, twelve are units of local chains and twelve are units of sectional and national chains.

STEEL OPERATIONS UP ON MOTOR ACTIVITY

(Continued from Page 1)

year ago were at 78 per cent., the highest level reached during 1930.

Strip production in the valley continues to be of significant strength when compared with production in other departments. Fabricators of automobile fenders have been taking strips in increasing quantities, and strip capacity is somewhat more active than that for sheets. In neither product have producers or consumers built up topheavy backlogs with respect to operating levels which either buyers or sellers consider average.

The continuous increase in Republic Steel Corporation operations in recent weeks apparently reflects favorable developments in the automobile industry, on which the steel company depends as an outlet for its high proportion of light products. Republic is the largest sheet producer in the district and one of the largest producers of alloy steels in the world. This week its operating rate is higher than other major companies of the district. Activity of this company apparently closely reflects findings of leading journals in the steel trade of a distinctly better tone to automobile steel buying.

CLASSIFIED ADVERTISEMENTS IN THE AUTOMOTIVE DAILY NEWS BRING RESULTS